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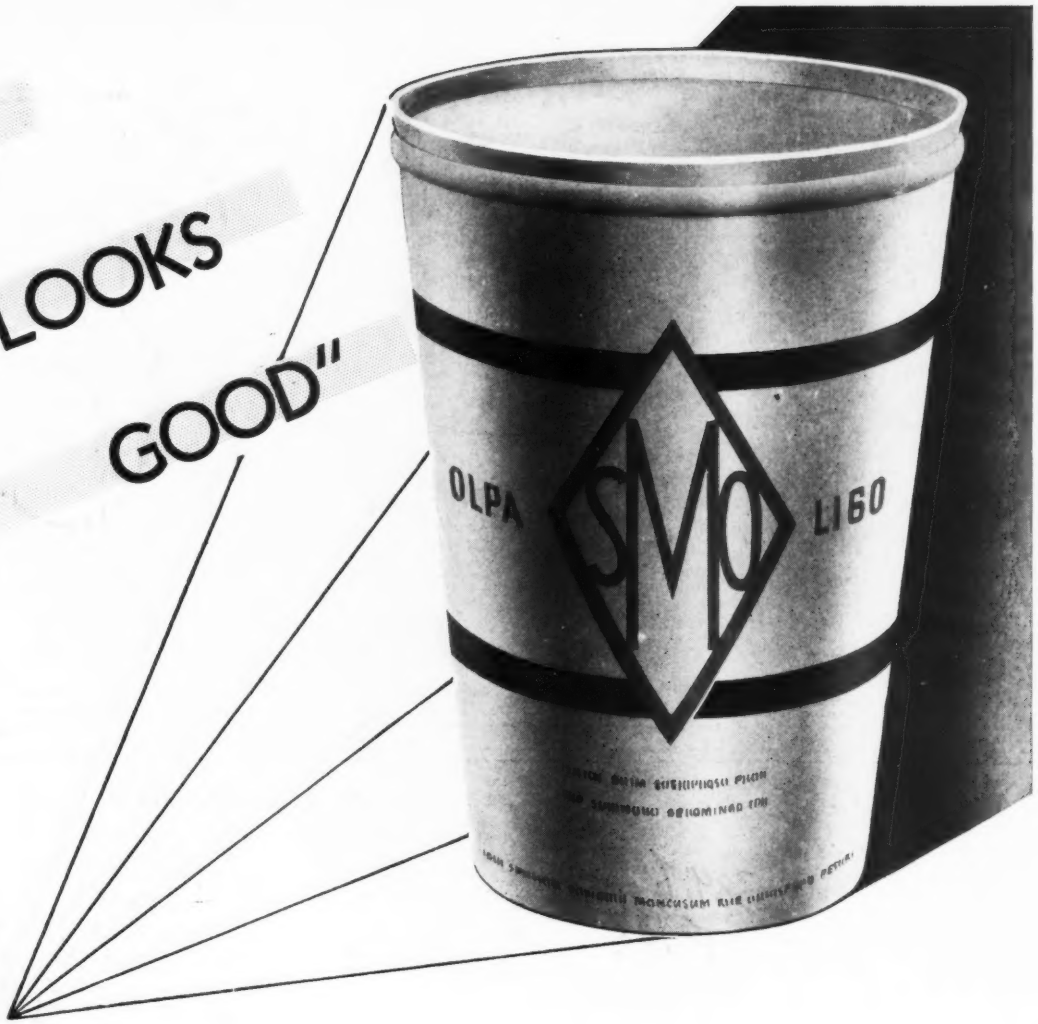

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FOOD MANUFACTURE

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APRIL . . . 1935

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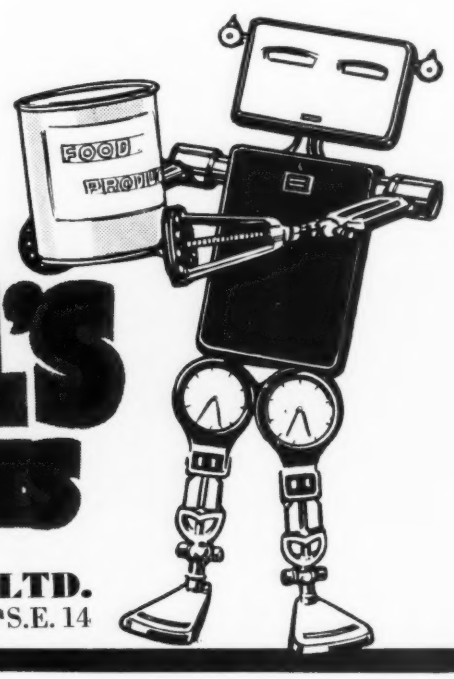

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FOOD MANUFACTURE

Vol. X, No. 4 April, 1935

Meat

TWO IMPORTANT events in the scientific study of meat have to be credited to the month of March. One is the Conference on Meat held on the 8th at Liverpool University, jointly arranged by the Liverpool section and the Food Group of the Society of Chemical Industry. The other is the issue of Dr. E. H. Callow's paper on " Carcase Quality of the Pig in Relation to Growth and Diet ". It is hardly necessary to mention that Dr. Callow is one of the research workers at the Low Temperature Station, Cambridge, and to remind our readers of his valuable contributions to the scientific study of bacon curing, most of which are recorded in the publications of the Food Investigation Board.

Growth of the Pig

Dr. Callow's paper opens by tracing the three main phases of growth of the pig; first, skeleton growth predominates; then muscle, followed by fat. He is able to formulate other tendencies in the progressive development of the animal, although there are, of course, differences according to breed and strain. He quotes data showing the average time taken by various breeds to reach certain live weights and discusses the relation between growth-rate and length of carcase.

The important question of the effect of diet on growth and carcase-conformation is examined in considerable detail, in which connection he draws attention to the outstanding merit of carcases of frozen pork from New Zealand, in which the proportion of flesh is relatively great. This he attributes to an ample supply of milk (particularly unboiled milk) and milk-residues in the diet, along with open-air management and grazing.

Fat

One can hardly complain of lack of attention to the study of animal fats. Dr. Lea, especially, and also Mr. Moran, and now Dr. Callow, all at Cambridge, have added enormously during the past few years to our knowledge of the mechanism of rancidity in fats. The subject was given a fair measure of attention at Liverpool and drew some acid remarks from Professor Hilditch, who cast doubt on the generally accepted view that unsaturated fats tend to oxidise, forming peroxides which lead to the production of aldehydes and ketones, responsible for the acrid flavour associated with rancidity.

Dr. Callow notes that bacon fat is more liable to develop rancidity than pork fat, owing to the fact that rancidity is catalysed by the salts used in curing, and the onset of rancidity may be quite sudden. Bacon and hams which undergo a long period of manufacture (*e.g.*, Midland-cured bacon and York hams) are more liable to become rancid than more rapidly produced products (*e.g.*, Wiltshire bacon). Acceleration of rancidity is the rule in soft fats and is also brought about by use of unsaturated oils (such as cod liver oil and the oil in fish-meal) in the food of the pig.

These and other matters of great interest and concern to breeder and curer alike are discussed by Dr. Callow—as, for instance, the composition of fat, muscle, and bone, and the quality of carcase and its measurement—and we have no doubt but that his paper will come to be regarded as the standard exposition of these matters.

The Proteins of Meat

At the Liverpool Conference Dr. Smith dealt with the structure of muscle, the muscle substance proper being the familiar red meat, and described the proteins present in the various portions together with the pigments which give the meat its characteristic colour. He pointed out that muscle tissue consists largely of two insoluble fibrous proteins, (*a*) collagen (or white fibre), which gives gelatin on heating with water; and (*b*) elastin (or yellow fibre). The muscle substance proper contains myosin and myogen, which are proteins of the globulin class. The solubility of such proteins is very sensitive to

changes of temperature, salt concentration, *p*H, and according to whether denatured, coagulated or not. Phenomena of this type might be related to drip in stored meat and the tenderness of meat after storage. Dr. Smith outlined improved methods for the determinations of these proteins and showed results obtained before and after storage. In brief, he minces the sample and stirs it with a suitable solvent, assisted by occasional grinding with sand. He found some time ago that a 10 per cent. solution of ammonium chloride is an excellent solvent, six extractions removing about 95 per cent. of the soluble myosin-myogen contents. Recently he has improved on this by the use of an 8 per cent. solution of lithium chloride. The separation of the two proteins one from the other is based on their solubility relations; thus, if the extract is diluted 20 times with water, the myosin is thrown out as a cloudy, gelatinous precipitate.

Problems centring on denaturation of the proteins were also discussed by Dr. Smith, and these have an important bearing on practice.

Changes in Meat

The paper on "Post-mortem and Refrigeration Changes in Meat" by Dr. T. Moran reviewed the chemical and physical changes in muscle during rigor mortis, and discussed the changes in muscle and fat on further storage. These included (*a*) denaturation of the proteins, (*b*) changes in the muscle pigments, (*c*) rancidity in the fat, and (d) bacterial breakdown. The latter, it was said, could be reduced very considerably by clean handling of the meat, and this was probably the most important factor in the storage of meat. Changes during storage could be controlled by adjusting the conditions of temperature, humidity and gaseous environment.

Although it was possible, said Dr. Moran, for frozen meat to be edible and wholesome after storage for months or even years, there was a definite loss of quality due to the fact that the structure of tissues was broken down by the freezing. "As far as meat is concerned", he added, "no method of freezing and thawing has yet been found which does not alter the appearance and texture of the tissue."

Storage in Carbon Dioxide

Dr. Moran stated that storage in an atmosphere of 10 per cent. carbon dioxide has made possible the transport of chilled beef from Australia and New Zealand in welded steel-lined chambers to prevent leakage of the gas. Already in the past year or so several thousand tons have been landed here in perfect condition, and last year the U.S. navy was fed on meat which had been stored in carbon dioxide.

This practice is the outcome of experiments which showed that carbon dioxide in any concentration slows down the growth of the bacteria and moulds commonly found on meat. In an atmosphere of 10 per cent. carbon dioxide at 0°C., for example, the storage life of meat is approximately double that of meat stored in air under similar conditions—*i.e.*, it is extended to 60 or 70 days. A carbon dioxide concentration of 40 per cent. at 0°C. completely arrests mould growth. A limit of 20 per cent. is, however, set owing to the fact that at higher concentrations there is a rapid production of brown methæmoglobin with loss of "bloom".

Storage at concentrations below 20 per cent. is applicable to most meats, including mutton and pork, but in the case of bacon the main problem is to prevent oxidation of the fat and for this reason high concentrations, even up to 100 per cent. carbon dioxide, are required.

Pointers of Change

The paper by Mr. L. C. Baker, of J. Lyons and Company's Research Laboratories, was concerned with the constituents of meat acting as pointers of change. Certain constituents of food, he said, might be utilised as indicators in the study of food products and called "pointers of change". In the case of meat, lactic acid increased rapidly immediately after slaughter, with corresponding fall in the *p*H; the increase in the tenderness of meat on maturing under suitable conditions had been considered due to the presence of this acid. Incipient putrefaction had been detected by a rise in the *p*H and by an increase in the amount of ammoniacal nitrogen. Cooking, said Mr. Baker, lessened the percentage of moisture and of water-soluble extractives and coagulated the proteins; in this connection, boiling was more drastic than roasting. The colour of meat, due to hæmoglobin from the residual blood, was an excellent guide to the quality of meat, the colour changing from red to brown on oxidation. Taint in the fat had been co-related with increase in the amount of free fatty acid and of active oxygen.

Bacteria and Moulds

Dr. Moran pointed out that in freshly killed meat there is usually only a small bacterial count. During storage multiplication of the bacteria is

normally confined to the surface, although there is always the possibility of invasion taking place *via* the bloodvessels and lymph spaces.

The majority of bacteria found on meat stored at about 5° C. or below belong to the two genera, *Achromobacter* and *Pseudomonas*. Their optimum temperature is about 20° C., and they will grow down to about −3° C. The growth of most bacteria with an optimum at 37° C., including the majority of pathogenic organisms, is stopped or greatly inhibited below 5° C. A slimy or greasy surface of meat indicates a minimum count of about 30 million organisms per sq. cm. or about 5 bacteria thick.

For all practical purposes the growth of bacteria ceases at −3° C. and of moulds at −7° C.

Cleanliness

Mr. Hall Williams dealt largely with hygienic considerations in the slaughterhouse. The water used for washing down the freshly slaughtered carcases in order to remove blood stains, if it is not renewed at frequent intervals, may have a bacterial count of the order of millions per c.c. Nowadays, in certain of the meat works in Australia, knives, cloths, overalls, and other equipment are carefully sterilised. The water for washing the carcases is sterilised, while at numerous points on the floor of the slaughterhouse the men can wash their hands and arms in clean or sterilised running water. Special measures are likewise taken to avoid any possibility of infection from contact with the hides and intestinal contents. These works prepare chilled beef for the English market, and by taking these precautions they have increased the storage life of the meat by several days. "Our butchers", said Mr. Williams, "take their methods from the New Testament; the Jews take theirs from the Old Testament." He painted a somewhat lurid and bloody picture of the slipshod methods of English slaughtering, and coupled with it an eloquent plea for centralised abattoirs and hygienic conditions.

Shower-Baths

Mr. Williams also emphasised the importance of resting the animal before slaughter. "Think what the poor steer has to put up with", he said. "Is it any wonder that he is hot and bothered?" And he followed the animal in its various adventures from the farm to the private slaughterhouse. He advocated putting the animal under a shower-bath before stunning, and he supported Dr. Moran in advocating personal cleanliness among the employees, and sterility of the floors, walls, knives, and so forth. Sir William Hardy said once that a slaughterhouse should approximate in cleanliness to the operating theatre in a hospital.

Lactic Acid

The use of lactic acid in foodstuffs appears to be enshrouded in extraordinary mystery. Some people are in a dreadful panic about letting the proverbial cat out of the bag. Our curiosity is aroused. What's all the fuss about?

Let us recollect a few of its uses that have been proposed. It has been suggested for blending with fruit juices, as in jam-making. It is stated to have emulsifying properties and might find a place in salad dressings, etc. It is probably used in some dry ginger ales to speed up the maturing process. It is used in connection with yeast culture, sometimes in brewing, and has been proposed for addition to pickled vegetables. Patents have been granted for the use of lactic acid as a preservative in the packing of egg yolk, and it has been suggested that it would aid in the prevention of rancidity in edible oils. Then there are infant foods. But why all the mystery?

Factory Fumigation

The fumigation of food factories and warehouses is now an established fact. We have referred to the various methods employed from time to time and have published articles by experts who have supervised fumigations and made complete investigations of any possible after-effects. In view of the extensive researches on this subject and, as far as we know, the absence of any objectionable after-effects, it is rather surprising to note that a well-known Public Analyst has decided to attack the practice. In his report it is stated that "for some time past, methods of fumigation of dried fruits have been proposed—and, it is believed, adopted—which are in my opinion possibly dangerous and certainly objectionable, to the consumer". This statement is rather astonishing in the light of published researches. Beran (*Analyst*, 1933, p. 775) states definitely that "the fruit is not able to take up and retain any appreciable amount of the acid (hydrocyanic), the small quantities adsorbed superficially disappearing two or three hours after the fumigation". Dr. Monier Williams' report No. 60 on the effect on foods of fumigation with hydrogen cyanide (1930) did not give cause for any undue alarm, if the fumigation was carried out properly. Prussic acid is not the only fumigant in use, and ethylene oxide (mixed with carbon dioxide) is being used increasingly. In regard to this fumigant the work of Sudendorf and Kroger (*Chem. Zeit.*,

1931) showed that a large variety of foodstuffs suffered no perceptible alteration through exposure to the gas. We agree that fumigation is an objectionable process, but it is necessary. No doubt the same Public Analyst who is so antagonistic to fumigation would wax equally eloquent if he found foodstuffs infected with insect larvæ which would have been eliminated by fumigation. This is a case of choosing the lesser of two evils, and in our view carefully controlled fumigation is definitely the lesser.

Olive Oil and Adulteration

The detection of olive oil adulteration is a matter of some difficulty, but recently Cocking and Crews have applied a fluorescence test which appears to be quite useful. The sample is treated with decolorising charcoal, allowed to stand overnight and then filtered and examined in a thin bottle of non-fluorescent glass in filtered ultra-violet rays. Genuine virgin olive oils, which had originally a deep golden yellow fluorescence, became almost colourless and showed only a faint and dull blue fluorescence. Certain olive oils which have recently appeared on the market show an opaque dark purple or chocolate coloured fluorescence before treatment, and Cocking and Crews believe that this is due to the addition of some substance to mask the presence of such adulterants as arachis, sesame and tea seed oils which show a blue fluorescence. Treatment with charcoal removes this masking completely but leaves the blue fluorescence. It is stated that about 5 per cent. or arachis or tea seed oil can be detected by this method. The employment of ultra-violet light fluorescence is proving a most valuable means of detecting adulterations that previously might have been suspected but difficult to prove.

We published a short article on the fluorescence analysis of foodstuffs in the July, 1934, issue of this journal.

A Notable Jubilee

One's thoughts are naturally turning to jubilees this year, and we are reminded of the rapid flight of time when we realise that this year marks the fiftieth anniversary of the American Association of Official Agricultural Chemists. It was founded at Philadelphia in 1884 by ten representative agricultural chemists as a result of a series of informal meetings held in the years immediately preceding. At the very first meeting methods for the determination of phosphoric acid and potash in commercial fertilisers were adopted and work was begun on the perfection and adoption of methods for the entire range of agricultural chemistry. Later the passage of food, drug, insecticide and fungicide control legislation made it necessary to extend the scope of the Association's activities because their methods were designated as official for the enforcement of such legislation as well as for the control of feeds and fertilisers by the various States. It was not until 17 years later that a referee on Methods of Analysis applicable to cereals and cereal products was appointed. This marked the beginning of the American Association of Cereal Chemists which has done so much pioneer work in this important branch of food chemistry. The publications of the Association are probably to be found and in daily use in cereal laboratories all over the world. This alone is sufficient testimony to the value of the Association's work. We congratulate the Association on attaining its golden jubilee.

Colour of Flour

It is the endeavour of most flour millers to produce flour of uniform quality all the year round, despite the great variations in the properties of the wheats available. One very important variable is the colour of flour. We do not propose to enter into any discussion as to the ethics of flour bleaching or its effect on the quality and nutritional value of the bread produced. We simply accept flour bleaching as an established custom of the milling trade. This being so it is evident that some numerical expression of the colour of flour from day to day is an important essential in general flour testing. The ordinary methods of colour determination are not easily applied to flour where one has to differentiate between delicate shades of white and pale cream. Visual examination in the dry state is not satisfactory, but recently researches in America on the measurement of colour in flour and bread by means of Maxwell discs seem more promising. It appears as if the translucency of a given sample is the most important factor governing the colour. In other words, the colour differences observed between dry flour, dough, bread, etc., are due largely to differences in light penetration produced by wetting, heating, texture, and granulation. In spite of this work, however, it is likely that the methods dependent on the extraction of the pigmenting substances with solvents will hold the field. In this connection the work of Markly and C. H. Bailey described in the current issue of *Cereal Chemistry* on the nature of the pigments of the gasoline and dilute alcohol or acetone extracts is of great interest.

THE CANNING OF GRAPEFRUIT

CANNED GRAPEFRUIT originated in Porto Rico, but during recent years a large proportion of the pack has been canned in Florida. The best canned product is obtained from fruit which is allowed to ripen on the trees. Under-ripe fruit, or fruit which ripens after picking, has a marked bitter flavour, and the sections are difficult to remove without breaking.

Preparation

The fruit is generally graded before canning, and the standard sizes are 54, 64, and 70 per shipping box. In some of the largest canneries the fruit is discharged from trucks into hoppers, from which it is elevated to graders arranged above a series of storage bins; the fruit is distributed into these according to size.

The grapefruit is discharged from the bins on to a 30-ft. roller conveyor carrying it to the scalding tank, which is about 35 ft. in length and contains water at about 206° F. The fruit is passed through the tank on a metal conveyor and remains immersed in the hot water for from 2 to 5 minutes, depending on the thickness of the peel. The object of the scalding is to expand or puff the peel so as to facilitate its removal.

The scalded fruit is then transferred to the feed conveyor of the peeling table by means of a cross conveyor, and while upon the latter it is cooled slightly by cold water sprays to render it easier to handle.

After the fruit has been "yellow-peeled", it is conveyed in baskets to the intake of the lye-peeler. Here the fruit is sprayed from above and below by a 1·5 to 2 per cent. solution of caustic soda at a temperature slightly below boiling point for a period of 10 to 15 seconds. As the fruit emerges from the lye-bath it passes under strong sprays of water which remove adhering lye solution and particles of loose membrane. The baskets of fruit then pass under a set of drying fans and thence to the segmenting operators, who remove the segments from the membrane by means of specially shaped stainless steel knives. This operation is difficult, and the necessary skill and speed can only be acquired by experience. The object is to remove the sections without breaking them, as a first-grade pack must consist mainly of whole segments. The sections are placed on shallow aluminium trays on which they are carried to the filling tables.

In some factories the lye-peeling method is not used, the outside peel being removed by hand without any preliminary heat treatment. The white material under the peel is then removed by means of a sharp knife, and the sections are separated from the membrane in the ordinary way. Lye-peeling gives a somewhat higher yield, but with ripe fruit it tends to expand and burst the juice cells, and it also softens the fruit. Consequently hand peeling is generally used for fruit which is at all overmature.

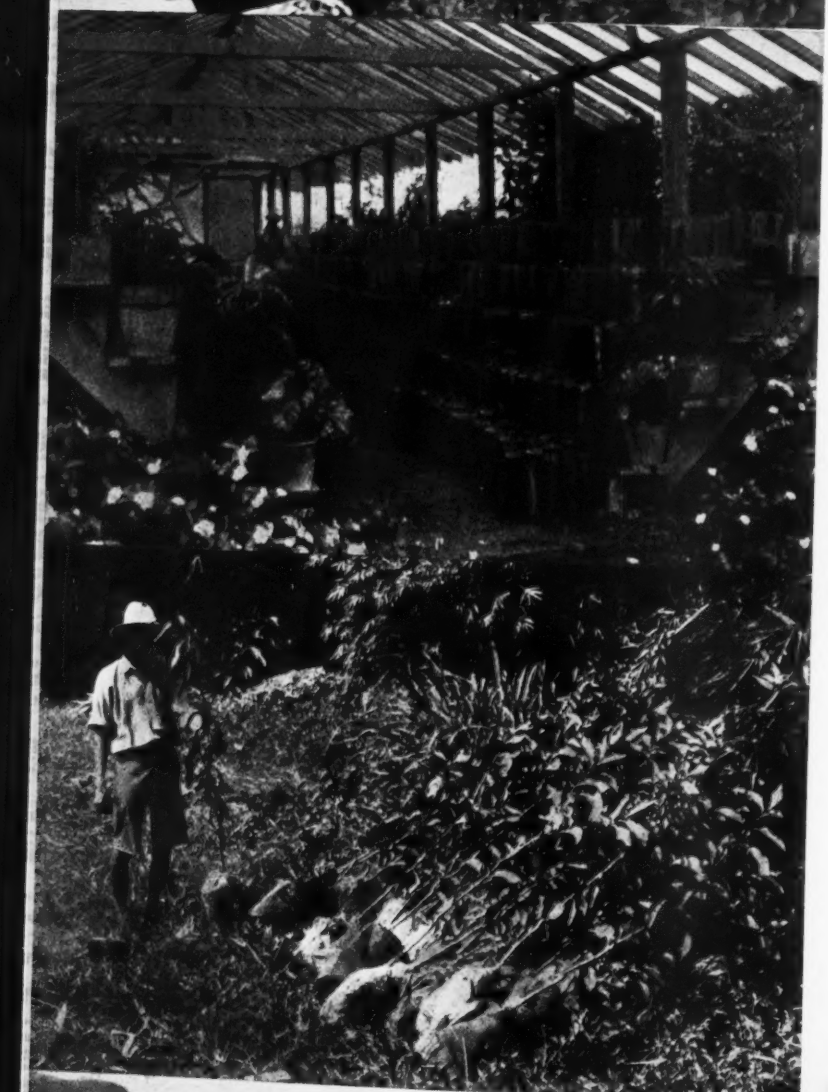
Filling and Syruping

The cans are filled by hand, and here again much practice is necessary. The segments are packed close together to form a solid pack, and about 17 oz. of fruit is packed into each No. 2 can.

The sugar is generally added in the form of syrup at a density of 60° Brix, and in some canneries this is added before the sections are packed into the cans. The equivalent of about 2 oz. of sugar is added to each

(By courtesy of the West India Committee.)

A close-up of the fruit under natural conditions.



No. 2 can; some canners prefer to use dry sugar instead of syrup. The addition of syrup is, however, generally considered to give the most satisfactory product.

Exhausting, Sterilising and Cooling

Two methods of exhausting are commonly used. In one case the open cans, or in some instances cans with lids loosely crimped on, are passed mechanically through water maintained at a temperature of 180° F., the cans being exposed to the hot water for 25 to 30 minutes. In the second method, which has been introduced recently, the cans are sealed in a vacuum closing machine under a vacuum of 22 to 25 inches.

Canned grapefruit is sterilised at a temperature of 180° to 190° F. for 25 to 40 minutes, the shorter time being given to the cans which have been exhausted by heat.

After processing, the cans are immediately cooled in water until only enough heat is left in them to evaporate surface moisture.

Observations

In conclusion, the following points are of interest in connection with the canning of grapefruit.

Canned grapefruit becomes slightly firmer after being kept for some time in the cans, and thus it is desirable to delay shipping for at least two weeks after canning.

Plain cans are used for grapefruit, as it has been found that hydrogen swells develop more slowly in plain than in lacquered cans.

On storage for long periods crystals of naringin are liable to develop.

It has been shown by Kohmann and Sanborn (*National Canners' Assoc. Bull.*, 23L, 1927) and others, that the storage temperature of the canned product, the vacuum in the cans, and the amount of headspace are factors affecting the rate of development of hydrogen springers.

Eddy, Gurin and Kohmann (*Ind. Eng. Chem.*, 1932, p. 457,) found that there is no particular difference in the vitamin content of canned grapefruit and raw grapefruit.

H. B. C.

LEFT : ***Top*—Budding grapefruit. *No. 2*: Grapefruit seedlings in pots. *No. 3*: Budded grapefruit plants lifted for planting out. *No. 4*: A general view of a grapefruit plantation.**

BELOW : **Close-up of the flower of grapefruit.**

All these photographs were taken in Trinidad, and are published by courtesy of the *West India Committee*.

Thermal Death Point of Bacteria and Heat Penetration IN CANNED FOODS

HEAT IS the medium which is universally employed to prevent bacterial spoilage in perishable foods packed in hermetically sealed containers. It is therefore of fundamental importance to the food canner to know, as exactly as possible, the temperature needed and the length of time that the heating has to be continued in order that the goods which he produces should be of satisfactory quality.

In the early days of the canning industry, before the subject had received scientific investigation, it was largely a case of "hit or miss", and frequently the canned food was spoiled by over-cooking or, on the other hand, became unsound because the organisms of decomposition had not been destroyed.

Two important factors have to be taken into consideration in arriving at the necessary process for any particular article which is to be preserved by canning. The first is the thermal death point of the organisms and spores with which the material is likely to be contaminated, and the second is the length of time required to reach the desired temperature throughout the whole contents of the can or other kind of sealed container.

Thermal Death Point

During recent years much experimental work has been carried out with the object of determining the thermal death points of the spores and vegetative forms of bacteria. There is, however, much that is obscure, for there seems little reason to doubt that the degree of heat necessary to bring about destruction depends upon the nature of the medium in regard to its composition and *p*H value.

In the author's laboratory investigations have recently been carried out on the thermal death point of a strain of *Bacillus Proteus Vulgaris*, and it has been found that a suspension of this organism in nutrient broth of *p*H 7·0 is destroyed at a temperature of 60° C. after a lapse of time of two minutes, but that the same organism when suspended in meat shows a very much higher thermal death point, on occasions even as high as 98° C. Tanner (the author of *Microbiology of Foods*) has apparently met with the same phenomenon, and at present is unable to offer a satisfactory explanation.

The fact that an acid medium reduces both the time and temperature needed to bring about the destruction of bacteria has been definitely established. Hallman and Stevens (*Ind. Eng. Chem.*, 1932) state that "hydrogen ion concentration greatly influences the thermal death time of highly resistant spores. Definite data on the subject are somewhat meagre, but it is doubtful if even the most resistant spores will withstand a temperature of 100° C. for more than five minutes if the *p*H of the medium in which they exist is 4·5 or lower. This reduction in time and temperature brought about by acidity is of importance to the canner of acid fruits because it enables this class of article to be processed satisfactorily at the temperature of boiling water, and even if complete sterility is not attained the low *p*H value inhibits the development of any undestroyed spores into the vegetative form."

Such temperatures and times are of course not applicable to meat and vegetable products such as beef and peas, where the medium is either practically neutral or even slightly alkaline. The time and the temperature needed to process articles of this kind are therefore much higher.

Resistance of Spores

Young spores are more highly resistant to heat than old ones, and the greater the amount of contamination that an article has undergone the more difficult will it be to sterilise it satisfactorily without employing such high temperatures for so long a period that over-cooking is inevitable, with consequent deterioration in the quality of the pack. It is therefore of great importance to handle goods as quickly as possible after they become available, and to maintain in the factory thoroughly hygienic conditions.

That young spores of some varieties of anaerobic organisms possess an extremely high power of resistance to heat is well exemplified in the case of *B. botulinus*, for which organism Meyer gives the following data:

"The maximum resistance to moist heat of the spores of *B. botulinus* artificially produced under best laboratory conditions" is as follows:

Time, minutes.	°*C.*	°*F.*
4	120	248
10	115	239
33	110	230
100	105	221
330	100	212

Much work has been carried out on the determination of the thermal death point and time of many micro-organisms and their spores, but results obtained by different workers are by no means concordant. This is probably to be attributed to varying conditions such as

(1) the number of spores present, (2) age of spores, (3) hydrogen ion concentration of the medium, and other variants, of which at the present time there is a lack of knowledge. It is therefore impossible to lay down definite times and temperatures of processing for any particular line of goods, unless these be fixed at such a high limit that the material will be ruined by the treatment. The manufacturer must, however, endeavour to attain sterility of his product, and should therefore subject his goods to the highest possible temperature for the longest possible time consistent with other considerations such as the quality of the finished article.

It will be observed, when attention is directed to the problem of heat penetration using large containers and solid materials, that in some cases several hours are needed before the heat reaches the contents of the can at the centre, and the temperature must be maintained *at the centre* for a sufficient period to ensure sterility. *B. botulinus* is by no means the only organism which produces highly resistant spores, so that if by chance the contents of a can of material of normal *p*H value were to be infected at the centre with one of the many sporulating anaerobic organisms such as *B. putrificus*, the time and temperature of the process would be so high that in order to effect sterility the material in the can would be ruined. In a well-conducted cannery it has been found by experience that the employment of a temperature as high as 248° is not ordinarily necessary, because if due care has been taken in the handling of the material no sporulating organisms will have found their way into its interior, although the surface may be, and probably is, infected. Interior infection is brought about by faulty methods of manufacture, such as unclean utensils and by allowing the goods to lie about for too long a period before they are processed. As the surface of the food in the container is always subjected to the longest time of heating, infection in that region is not of such importance as when it occurs internally.

Determining Heat Resistance

For details of the various methods of determining the heat resistance of bacterial spores, the reader is referred to:

1. Biglow and Eastry: *J. Infectious Diseases*, 1920, **27**, 602-617.
2. S. and T. Williams: *loc.cit.*, 1924, **34**, 516-520.
3. Dickson and Birk: *Proc. Soc. Expt. Biol. Medicine*, 1921, **19**, 99-100.
4. Magoon: *J. Infectious Diseases*, 1926, **38**, 429.

In general the methods consist of suspending the vegetative form of the organism and spores in neutral broth contained in a capillary tube, these suspensions being submitted to various temperatures for different lengths of time. Subsequent examination is then made in order to ascertain whether sterility has been achieved.

Tanner criticises the existing methods of determining the thermal death point of bacteria, in so far as canned foods are concerned, his point being that the conditions which exist in the can are not reproduced in the capillary tubes. He states: "There is a growing belief that a new thermal death time container should be devised which might be made of tin in which inoculated food itself could be heated. The container which shall be used is not especially important. It is desirable to have the spores in the food itself and have the container which is convenient to handle and which will permit the use of conditions as near as possible to those in the can."

Heat Penetration

It is obvious from what has been stated above that it is necessary to subject the contents of a can of food to a sufficiently high temperature, for the correct length of time, in order to ensure that the organisms of spoilage will be removed. This of course entails the destruction of heat resistant spores, and so that this may be brought about the whole of the contents of the can must be subjected to that predetermined temperature for the necessary period.

A knowledge must be obtained of the rate at which heat penetrates throughout the mass of the contents of the container. The further the material is away from the source of heat the longer will it take for it to reach the desired temperature; therefore the determination must of necessity be obtained by readings taken of the contents of the can at the centre.

The rate at which heat will penetrate the contents of the container depends upon—

1. The shape and size of the container.
2. The nature of its contents.
3. The difference in temperature to which it is subjected.

If it were possible to obtain accurate data by carrying out the heat penetration determinations in a fully loaded retort, in which processing on a manufacturing scale is ordinarily conducted, the actual behaviour of the material under manufacturing conditions could be studied. Unfortunately a number of practical difficulties arise which introduce considerable errors. It is true that the exact conditions of manufacture cannot be reproduced in the laboratory, but the possibility of much more accurate control makes it far preferable to carry out the work under laboratory conditions, and the correct time and temperature for the processing of any canned article of food can be safely based upon the data so obtained.

Use of the Thermocouple

Where steam pressure is to be used as a means of heating the container, a thermocouple is needed in order that accurate temperature changes may be recorded. It is not possible to employ a thermometer if anything more than mere approximation is needed, even when a brine bath is used as a source of heating. The area of the bulb of the thermometer is too large to give temperature readings in strictly localised spots such as the centre of the can. A type of thermocouple which will be found suitable for heat penetration determination is constructed of copper and constantan wires, the apparatus being connected to a suitable indicating meter which can, if so desired, be graduated to give temperature readings direct. The point of contact between the metals constituting the thermocouple should be as small as possible so that the

readings obtained refer to a small area, and thus increase the accuracy of the test. Where steam heat under pressure is to be employed for the test, the thermocouple must be firmly sealed into the can. This is done by soldering on to the can a packing gland of similar construction to that used in steam valves, the column of the thermocouple taking the place of the shaft of the valve. The leads are passed through a valve of the same type, which is fitted to the lid of the autoclave in which the determination is made. The cold junction of the thermocouple is immersed in melting ice water in order to maintain it at a constant temperature. When a test is to be made the initial temperature of the contents of the can is carefully noted, and the thermocouple having been connected, the can is placed in the autoclave, the lid of which is closed, and the steam turned on. The autoclave will probably reach its maximum temperature in the course of a few minutes, but the contents of the can at the centre, as indicated by readings on the thermocouple, will rise much more slowly.

The accompanying curves show the heat penetration determination upon a 2-lb. tin of ox tongue and a 2-lb. tin of Scotch broth, and it will be noted that while the former required a period of 185 minutes before the contents at the centre reached 121° C., the latter reached the same temperature in 40 minutes. The difference between the two is readily explained by the fact that owing to the absence of any liquid in the ox tongue, practically the whole of the heat would be conveyed to the centre by conduction, whereas in the Scotch broth, being of a liquid nature, convection currents were able to play the major part.

It should be noted that the curves show three stages:

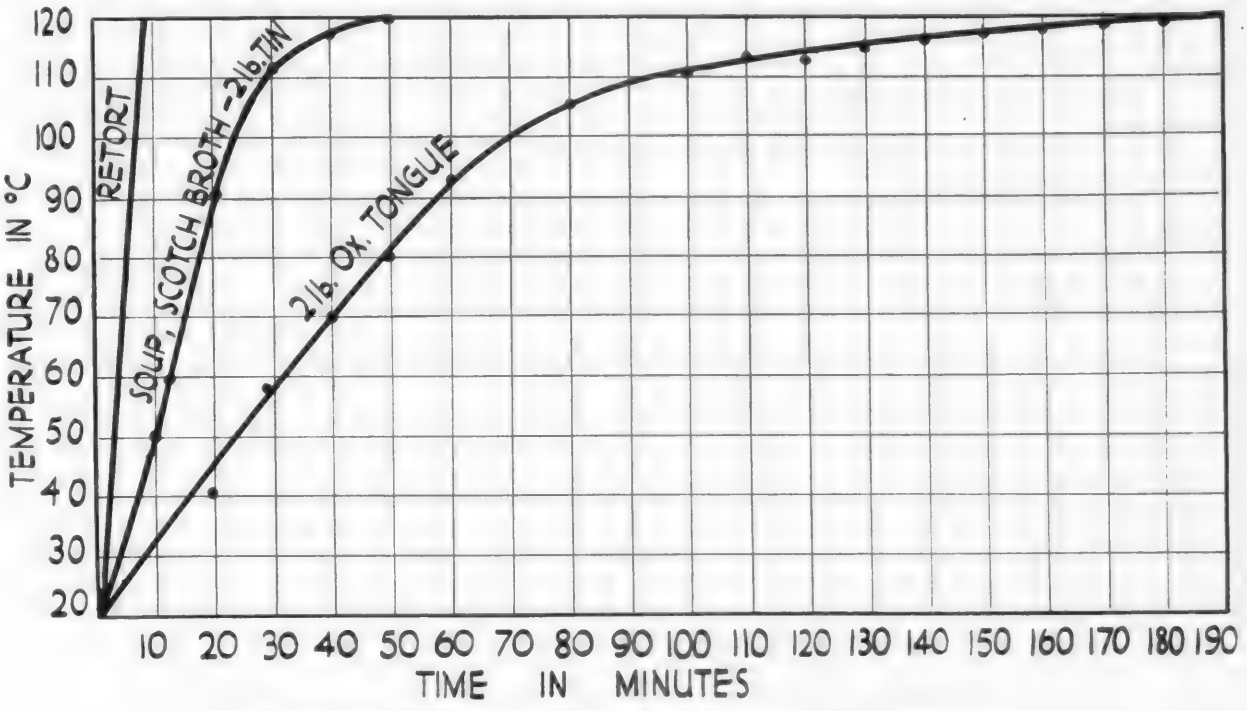
1. The temperature at the centre of the can rises very slowly at first; this is because the outer regions of the can are absorbing all the available heat.

2. The heat shows a relatively rapid rise at the centre of the can. This is due to the period during which the outer portions of the material are transferring their heat to the inner portions.

3. A slow gain in temperature over a prolonged period. This is due to the fact that there is only a small difference between the temperature of the steam and the temperature of the whole contents of the can.

A study of these two typical curves will indicate the absolute necessity for the determination of the heat penetration time on every shape and size of container used, and for every different kind of material packed. It may be stated in general that the density of the material has a great bearing upon the rate of heat penetration. Another important factor is the shape of the container. The heat will find its way to the centre by the shortest possible route, and it will be readily understood that a 2-lb. tin of tongue only 1 inch in height would heat at the centre much more quickly than one of less diameter but 4 inches in height.

A word of caution is desirable in regard to the rate of heat penetration into cans which contain solid lumps of material suspended in the liquid, such as meat and vegetables, for example. If precautions are not taken to fix the thermocouple into the centre of the largest portion of material in the can, and have that piece of material in the centre of the can, quite erroneous data will be obtained, as owing to convection currents in the liquid, this latter will heat more quickly than the solids in suspension.



A Comparison of Ox Tongue and Scotch Broth in respect of Heat Penetration.

(*By courtesy of the Ministry of Agriculture and Fisheries.*)

Hosing Oysters in one of the Covered Tanks at Brightlingsea.

OYSTERS

Their Life History, Cultivation and Commercial Purification

By

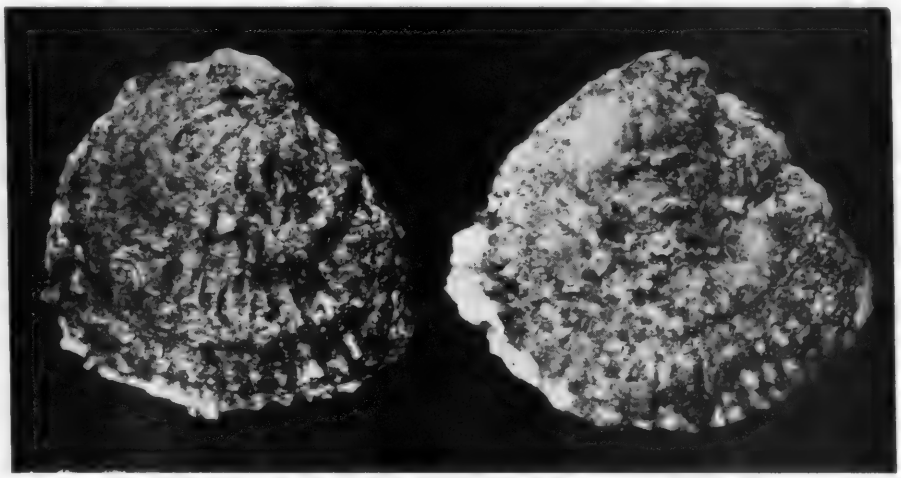
Elliott B. Dewberry

M.R.I.P.H., M.R.San.I.*

The Young Oyster

THE FECUNDITY of a single oyster is amazing. It may produce anything from 300,000 to 1,800,000 young, but unfortunately few reach maturity. The fertilised eggs, which in the early stage consist of oval clusters of minute globules floating in a transparent fluid, are retained and developed within the shell of the oyster. They pass from the ovary and adhere to the gill plates and folds of the mantle, being cleansed and nourished by the ceaseless stream of sea water passing over them, and are hatched. During this period the parent oyster is termed "white sick". As growth proceeds the embryos develop a little circlet of cilia (called the velum) at one end for swimming purposes, and their bodies also become pigmented in parts and assume a grey colour. The colour, however, darkens considerably as growth of the internal organs proceeds. Later the embryos become furnished with a pair of delicate symmetrical cockle-shaped shells, which are so constructed that they allow the embryos to protrude or withdraw the ciliated swimming apparatus at will. The parent oyster at this stage is called "black sick".

In the course of a week or so the young fry are ejected from the parent shell into the sea in thousands. Each of these semi-transparent active organisms is about $\frac{1}{150}$ of an inch in length. The dark brood floats, or swims, towards the surface of the water and is carried by the wind and tide in all directions. More often than not the individuals perish through lack of suitable food, or else fall a prey to fish, mollusca, or crustacea, especially the last named, which eat enormous numbers. Small fish and shrimps frequently lie under the shell of a breeding oyster ready to devour the larvæ as they are ejected. After a short interval, varying from a few days to weeks, the larva has grown considerably, and owing to its increased weight sinks to the bottom of the sea. If it drops on to soft and slimy mud, to which it cannot attach itself, it perishes, and in fact more than half the surviving larvæ die through landing on unsuitable ground. Should it fall on to a clean hard substance, however, it becomes attached to it by exuding a cementing material from the edge of its under shell. It is now termed the "spat". Suitable temperature and calm conditions are important factors in the proper deposit of spat. As soon as the spat becomes firmly fixed it loses its



English Native Oysters.

* *Continued from February issue.*

swimming apparatus and begins to grow rapidly, becoming in shape and mode of feeding similar to its parents. It increases from $\frac{1}{10}$th of an inch in diameter to the size of a threepenny piece in from five to six months, and in a year has reached 1 inch in diameter. In three years it reaches 3 inches across, but after this growth is much slower and the shells increase in thickness rather than in circumference. The oyster commences to breed at the age of two years, but it is not until it has reached the age of five to seven years that it is regarded as perfect by the epicure. The various stages are called the spat, brood, half-ware, and ware or oyster, a year marking each stage. It is considered a good breeding season if the fall of spat results in an average of four survivors out of every million.

The American (*Ostrea virginiana*) and Portuguese (*Ostrea angulata*) oysters differ from the British in the method of reproduction, as there are two distinct sexes in each of these species. The female discharges her ova into the sea and these are fertilised by the spermatozoa discharged by the male oyster. These discharges are estimated to contain 800,000 to 1,000,000 organisms. There is no incubation period, and if the ova do not meet the fertilising male sperms they perish. It is held that not more than one young oyster in every million survives to reach maturity. American oysters rarely spawn in this country as they require sea water at a temperature of about 70° F.

Natural Enemies of the Oyster

The oyster has numerous natural enemies, amongst which are the starfish, sea urchin, crab, prawn, mussel, boring whelk, skate, ray, cuttle-fish, burrowing worms, and the boring sponge. The common five finger starfish not only devours the young, but also attacks and eats the full-grown oyster. The spat of mussels also give considerable trouble through settling on the oyster shells and necessitating the oysters being removed and cleaned.

Oyster Culture

Careful cultivation of the oyster, which now receives considerable attention, is necessary in order to prevent contamination and to produce first-class shell-fish. The principles of oyster culture have, however, altered little in spite of the antiquity of the industry. The foremost requirement in the selection of a location for successful oyster culture is clean, well-aerated brackish water, changed regularly and completely by the tide. Further, the beds should be as free as possible from sand and mud, as a soft bottom allows the shells to sink so that the oysters are smothered. Shifting sand will, of course, destroy them. With regard to the depth of sea water, the oyster beds at Whitstable are always under water, the greatest depth at any tide being from 30 to 40 feet and the least 10 feet; these beds are very carefully prepared and maintained. The oyster beds at Brightlingsea, on the other hand, are situated in a creek, and at low tide the edges of the oyster layings are exposed although in the channel the water is from 1 foot to 10 feet deep. At high tide the depth is from 15 to 30 feet deep.

The modern oyster farm is laid out somewhat on the lines of an agricultural farm. A portion of the area, which is considered most suitable for growth and fattening, is divided into numbered parcs or squares, each square being marked by a buoy. The layout is recorded in the form of a plan. The oysters are sorted and relaid in the various numbered beds according to age and size. It is, however, necessary in relaying a stock of brood oysters that they should be in close proximity to each other, in order to ensure a plentiful supply of spermatozoa finding access to the bodies of the oysters containing egg cells to be fertilised. Oysters to be fattened should be spread as sparsely on the ground as is consistent with the extent and capacity of the bed.

Outside Treatment Tank at Brightlingsea. Note the brick "stepping stones".

(By courtesy of the Ministry of Agriculture and Fisheries.)

The Food Supply

The important question of suitability and sufficiency of food must always be an anxious one for the oyster culturist. However rich the vegetation may be, it varies with the temperature and the amount of sunshine which obtains in various parts of the beds. This fact necessitates the regulating of the number of oysters to the best parts of the feeding ground, and they must be thinned out when there are signs of insufficient plant food. On the other hand, the beds must not become overgrown with weeds.

During the summer preparations are made to ensure that a plentiful supply of clean "culch", as the material is called, is provided to secure the successful adhesion of the spat. This culch consists of clean hard material, such as oyster, cockle, or mussel shells, which have been sterilised or bleached in the sun. Many other materials have been used as culch, from bundles of wood to shells, stones, slates, tiles, etc. A special "V" form of inverted tile has been used with success, especially in France. These tiles are coated with thin layers of cement and sand. The spat adhere to the coating and can be easily detached by chipping. During the breeding season the culch is thrown into the sea in very large quantities, two or three times a week, to provide material suitable for the spat to attach themselves. A bed on which culch has been placed for several years in succession will gradually be made firmer by the settling of a part of the shells.

Experiments on the artificial breeding of oysters in tanks have been carried out by the Ministry of Agriculture and Fisheries during the last ten years and have been attended with considerable success, though the factors which determine a successful spat-fall will require further experimentation for their full elucidation.

Sanitary Precautions

The Fishmongers Company, which has done so much for the oyster industry, make themselves responsible for taking and testing samples of oysters sent to the London markets. The beds in which the bivalves are reared and fattened are examined by the Company's inspectors, and oysters from beds suspected of being polluted are subjected to bacteriological examination. The Company does not hesitate to stop the sale of oysters from beds which do not comply with the bacteriological standard which it has established. Oysters from contaminated beds may, however, be relaid for a specified period in

Oyster shucking room at the Canning Factory of the Beacon Oyster Co., at Wickford, R.I. All columns are sheathed in Monel metal, as are the edges of the concrete benches.

(By courtesy of the Ministry of Agriculture and Fisheries.)

The Oyster Purification Plant at Brightlingsea; view from the South-West. *Left*: Office. *Centre*: Foreground—Outside Treatment Tanks. At rear—(1) Shed for storing overnight oysters ready for treatment next day. (2) Sterile Water Storage Tanks. *Right*: Lean-to; Pump House; Main Building—covered treatment tanks.

Salt washers, blowers and other oyster equipment in Monel metal.

beds of recognised purity, in order to cleanse themselves; afterwards sale is permitted.

Sanitary surveys of shell fish beds are carried out by the Ministry of Agriculture and Fisheries. If serious pollution be found the polluted beds are closed by order of the Ministry of Health.

Commercial Purification of Oysters

The experiments on the purification of oysters, which have been carried out at the Fisheries Experiment Station (Ministry of Agriculture and Fisheries), Conway, North Wales, under the direction of Dr. R. W. Dodgson, have now resulted in the construction of a plant at Brightlingsea, Essex, for the commercial purification of oysters. The treatment, which has been successfully applied to mussels for nearly twenty years at the commercial installation at Conway, is based on the natural action of the bivalves in clearing their alimentary canals freely in sterilised sea water and thus gradually becoming cleansed.

A series of three large tanks is usually necessary, viz.:

Tank *A* for untreated sea water.
Tank *B* for sterilising the sea water.
Tank *C*, the cleansing or purifying tank.

All the tanks are of the same capacity, tank *C*, however, being divided into two independent halves. This provides the possibility of an output each day instead of, as would otherwise be the case, being limited to three days a week.

The sea water required for the treatment is run from tank *A* into tank *B*, where it remains overnight, and is mixed with a solution of bleaching powder of such (known) strength that the whole bulk has a concentration of 3 parts per million of available chlorine. At certain places, however, as at Brightlingsea, tank *A* may be omitted, the sea water being chlorinated while it is being pumped directly into tank *B*. Any residual chlorine is removed from the treated sea water with sodium thiosulphate as it runs into tank *C*.

The oysters are spread two deep on raised wooden grids in tank *C*, washed by a high-pressure hose, and given two successive baths of sterilised sea water lasting 24 hours each, followed by further careful hosing. The mud, etc., resulting from the hosing, together with any material subsequently ejected by the oysters, is removed by flushing out the floor of the tank before it is refilled. A final bath of 1 hour's duration in sea water containing 3 parts per million of available chlorine to sterilise the shells, completes the two-day treatment. At one stage of the experiments the oysters were arranged on partitioned wire racks, or trays, to facilitate cleansing, but these have now been abandoned in favour of spreading on the grids (as mentioned above); a special hose, with powerful jets working horizontally as well as vertically, is employed.

Owing, however, to the fact that oysters are affected by cold and do not open their alimentary canals freely at low temperatures, a special series of experiments was necessary to determine the extent to which the treatment water must be warmed in the winter. Two pairs of special tanks, 2,500 gal. in capacity, were constructed for this purpose, one pair inside a building with well-insulated roof and walls, the chlorinating tank having hot water circulating pipes, the other pair exposed. It was ultimately found that by heating the water to 56° F. in cold weather, cleansing was completed in two days.

The Brightlingsea installation is designed for treatment of Portuguese and American oysters, for which there is considerable demand in the summer, when unheated tanks are used. The winter cleansing capacity is 20,000 oysters daily, but the outside tanks bring the daily total up to 60,000 for summer working.

The bacteriological examination of oysters thus treated has demonstrated that they are freed from possible contamination and are suitable for consumption. Every package of oysters is "sealed" before being allowed to

Pieces of shell adhering to the shucked oyster after washing are removed by moving the bivalves with a Monel metal pusher from side to side across the slotted surface of a Monel metal skimmer.

Monel metal chutes, washers and skimmers used for 13 years in handling shucked oysters at the plant of North Atlantic Oyster Farms, Inc. The Washing and Packing Room.

be despatched, this seal being practically a government certificate of purity.

Packing and Preservation

The oysters taken ashore from the beds are examined and sorted, the smaller being returned to the beds. The larger are then scrubbed and washed, and sent to market tightly packed in barrels or baskets (kits) with the deep shell downwards, the lid of the barrel resting upon the oysters. Packed in this way they will keep fresh for from 6 to 8 days. Oysters will remain alive in cold storage and survive long shipments if packed in barrels immediately after being taken from the beds and placed in refrigerating chambers at a temperature of 35° to 40° F. They must not, however, be frozen. The commercial canning of oysters is an industry carried out in America, especially in Baltimore.

Oysters are not improved by being placed in tubs of salt water, but can live for some days perfectly dry if packed tightly together in a cool place with the deep shell downwards. They gradually lose their freshness, however, and soon begin to smell owing to the decaying animal and vegetable matter adhering to the outsides of the shells. The shells of a healthy oyster should be tightly closed. Even if the shells gape but slightly it is a sign that it is losing its freshness. The shells, if open, should close up on being handled; otherwise the oyster is dead and is not fit to be eaten. It is essential that oysters should be eaten in a perfectly fresh condition—*i.e.*, as soon as possible after they are opened.

The esteem in which the oyster is universally held as a delicate food is indicated by the numbers brought to market. During 1933 the number of oysters of British taking landed in England and Wales was 107,192 hundreds, valued at £96,255, and the quantity of those imported into the United Kingdom during the same year was 25,794 cwt., valued at £83,967.

Grading the oysters according to size. The table top and utensils are made of Monel metal.

Some Observations on Testing Canned Foods

(Continued from page 124)

and drying their contents is less than the value of the resulting product. Needless to remark, no bacteriologically unsound can should be opened in a cannery for such purposes.

In the case of condensed milk one sometimes has batches which contain a slight mould growth. It cannot be said that the particular mould is injurious to health, but one is loath to allow the milk to be sold for human consumption. It has been said that one reason why pigs grow so much better in Denmark than in this country is that they are fed on dairy by-products, and I am still to be convinced that some of the samples I have seen could not be usefully employed in this manner. There would have to be introduced some method by which cans could be marked to ensure that they would not re-enter the market in some other district.

It is usual to accept the condemnation of canned fruits which have become springers owing to slight hydrogen swelling, but it is very doubtful whether they are really unfit for other purposes. A considerable amount of canned produce is condemned annually as being unfit for food, but much of it is only destroyed after a fair proportion of the batch, stored under identical conditions, has been utilised for human consumption, yet one never hears of any ill-effects from those cans the contents of which have been consumed. The subject would, therefore, appear to be one which is worthy of serious consideration by health authorities, canners, and distributors, for there is no doubt that if this procedure were more generally adopted, some of the bitter disputes which occasionally arise about the quality of canned goods would be more easily settled.

SOME OBSERVATIONS ON TESTING CANNED FOODS

By T. McLachlan, F.I.C.

Public Analyst for
Westminster and Fulham

AS A result of the growth of the British canning industry a considerable interest is now taken in the examination of canned goods all over the country, and so much has been written that one hesitates to add to the confusion. At the same time there are a few aspects of the subject which are not usually stressed and which may be worthy of consideration.

When canning began to be more general in this country the inclination of importers was not to take the industry seriously. When, however, it was appreciated that British canners intended to establish themselves, the rumour got about that British goods were inferior to imported ones. This may have been partly correct at first, and in one or two respects it may still be true, but it will interest the trade to know that I have seldom had to give an adverse report on any British canned goods submitted to me for examination.

The same remark does not hold good for imported produce. Admittedly there may be a greater reluctance on the part of importers to have their goods condemned than is shown by the British packer, who will generally take them back in case of suspicion, rather than risk the possibility of a legal action with its consequent reflection on his products. The importer, on the other hand, knows that if the cans are condemned, there is little chance of his making a successful claim against the original packer, whom he will have to fight in a foreign court and who will be able to claim damage during transit and so on.

The Raw Material

At the same time one cannot but feel that some of the accusations made against the original raw material introduced into cans in this country was justified. If the produce is imported, the best has probably been sold for immediate consumption and is not available to the packer. If it is home grown it is difficult for the packer to obtain a sufficiently large quantity of fruit or vegetables of one quality and type to ensure properly standardised processing. The rainfall fluctuates tremendously over comparatively short distances in our islands, surrounded as they are by sea; it may not be generally known that the rainfall in some parts of the country is about three times as great as in other parts. Proximity to towns and the direction of prevalent winds play a tremendous part in the amount of sunlight available for the proper growth and development of plants, and canners would be well advised, in their own interests, to do all that they are able to support any reasonable proposals for smoke abatement. A further disadvantage of smoke is that it forms a thin film of dark tarry matter on the surface of fruit, which cannot be easily washed off during processing, and it will have a marked effect on the appearance of the matured canned goods.

Copper and Tin in Foods

During the last few months there has been an epidemic of copper in imported canned tomatoes and peas, the amount varying from about 5 up to 30 parts per million. This is probably due to the use of copper vessels for processing, for one cannot imagine that any advantage is to be gained by adding copper to tomatoes, even though it may improve the appearance of peas, and one might remind British canners that they should watch any copper or tinned copper vessels carefully. There may be nothing in it, but I am under the impression that the presence of copper in canned goods increases the amount of tin corrosion, for one usually finds an appreciable amount of tin in those goods which contain copper, and this is an added reason why canners should avoid its presence in their products.

One sample of canned cherries, which I recently examined owing to its blown condition, contained no less than 1,300 parts of tin per million, and, although tin may be employed to improve the colour of cherries, one cannot possibly imagine any packer adding all this amount intentionally.

Hydrogen Swells

Roughly there are two main causes for hydrogen swells in canned fruits and vegetables, the one controllable by the canner and the other by the tinplate manufacturer, but, even here, the canner is usually an accessory after the fact. It must be recognised that hydrogen swells are almost invariably due to bad stacking after processing. Whilst much is written about heat penetration into the middle of the can during processing, little is heard about penetration from the interior and the consequent cooling afterwards. Some people like to lay all the blame for hydrogen swells on the hydrogen ion concentration of the liquor, but they forget that the activity of free acid ions is increased tremendously at high temperatures, even though they may have learnt at school that some chemical reactions go fairly vigorously on boil-

ing, whereas there is very little action in the cold, as, for example, in the action of nitric acid on tin.

It is apparent, therefore, that insufficiently cooled cans will immediately be affected if the tinning is bad. One might also point out, in passing, that slow cooling will assist the growth of any thermophilic bacteria, which may not have been destroyed during sterilisation, as well as the development of any spores which may be present.

Rust

Many people when examining canned goods pay particular attention to the question of rust on the outside of the can, and at first sight this may be regarded as sheer superstition, for one may well argue that the condition of the outside of the can is no criterion of the quality of the goods inside; it is surprising, however, how frequently a badly rusted exterior is associated with a percentage of springers. The fact that the cans are so frequently springers proves that the can is not perforated, but I would suggest that with most cans any considerable amount of rust on the exterior is an indication that, during stacking, transport, or storage the atmosphere has been hot and damp and, in fact, ideal for causing hydrogen swells or assisting the growth of bacteria. This is a point worthy of consideration by those who are likely to be called upon to arbitrate in claims for spoilage or to act as witnesses in legal cases, as well as those connected directly with the trade.

Thickness of Tin Coating

With regard to the question of the thickness of tin necessary to ensure protection of the iron, it does not appear to be sufficiently appreciated that the main question is not the average thickness of the tin plating, but the continuity of the plating and the quality of tin employed.

It is doubtful whether any inferior tin is now used in this country, though there is still much plate which is improperly tinned. I feel that there is little doubt that the method of testing tinplate by gelatin and acid will give way entirely in the very near future to direct photometric methods, which have the great advantage of giving permanent records. The underlying principle of the test is that the plate is placed in direct contact with a slightly acidified sensitised paper, so that, wherever a flaw exists in the plating, small electric cells are set up which liberate an iron salt; this is, in turn, fixed by the sensitised paper. The paper is developed by usual methods after exposure. By suitable modifications this method can be employed for the examination of moulded plate, but it is doubtful whether it can be employed, at any rate at present, for the testing of seams.

In connection with the splitting of the plate in seams and mouldings, it is doubtful whether this ever takes place with properly adjusted tools; tin is sufficiently elastic to stretch so long as the iron sheet is treated properly. It is only when instruments are too sharp or when they are worked too quickly that the tin plating is ruptured, and this is the fault of the can manufacturer or the canner himself, and not of the plate maker, who is so frequently blamed.

Opening the Can

One thing which frequently troubles inspectors when examining canned goods in shops, warehouses, and so on, is whether a can on which they have been asked to express an opinion should be opened in the ordinary way or under water. In this case it must be appreciated that the distributor has usually called in the inspector with a view to obtaining his opinion so that the latter may condemn them and a claim be made for a refund. The cans are frequently rusty; the inspector cannot carry a lot of tools about with him and he has to work more or less single-handed. One point on which he has to satisfy himself is whether air has been drawn into the can or expelled. He would need to be a real expert to tell from the outside of the can whether it is an incipient springer or not. If the can is opened under water and the contents of the can then look dirty, he may be informed that the dirt has been introduced with the water.

As an instance I would mention the examination of prawns, which are usually canned dry. My own view is that it is best to carry an awl for the purpose of pricking the cans and to hold a match or a lighted taper against the tip of the awl when making the puncture; provided that the place is not too draughty one can almost invariably see the direction taken by the flame. In any case the can may then be opened and the goods examined and, if necessary, another can may be opened under water. It is only in extremely rare cases that an inspector is asked to examine a single can.

One point on which examiners ought to be certain, if there is any doubt about any goods which have been condemned on account of bulging, is that they have been quite cold when examined, otherwise, if the cans have been overfilled, there is a possibility that products, which are really satisfactory, may be condemned.

Condemned Goods

This brings me to another point, which is frequently overlooked, and that is the wholesale destruction of goods which may be condemned as unfit for consumption in their present condition. In my opinion much canned material is destroyed which is capable of being utilised under proper supervision for other purposes. By this I do not mean to say that I believe in resterilising; one of the first things I look for in case of doubt is the presence of a puncture indicating that a can has been opened and resealed. This is a process which should be illegal, unless the canner can prove that it has only been employed to drive out excess air, and in that case the onus of proof should be on him.

In many cases large cans of meat are condemned and destroyed on account of tin corrosion. Actually it will be found that the tin has not penetrated very far into the meat and the removal of a thin layer will leave a product which should be quite satisfactory for use in the manufacture of dog biscuits and for similar purposes. In any case, any but badly putrefied products could be used for manure, provided the cost of opening the cans

(*Continued on page* 122.)

THE FUTURE OF THE British Canning Industry

By A. Samson, A.R.C.S., A.I.C.

IT IS an indisputable fact that the major problem of the fruit and vegetable canning industry to-day is the marketing of its products. Most of its technical problems have been overcome, but to-day it is faced with a problem of no less magnitude—namely, to dispose of the canned products.

The progress of the canning industry until about 1932 was so rapid that canners as a whole became blinded to the fact that one day there would be a reckoning. That day has arrived, and they have been caught unawares.

It is inevitable that in an industry which adopts mass production technique, as is the case with the canning industry, its time-progress graph will show a very rapid rise, and moreover it is just as inevitable that, if the industry does not take every precaution to establish itself during its progress on a sound and sensible basis, the time-progress curve will reach a peak and then commence to descend at a rapid and possibly alarming rate.

It is no use attempting to fool ourselves; the canning industry of this country is to-day in a most unsatisfactory condition, and it is undoubtedly due to one fundamental problem—that of the disposal of its products—and the industry realises this.

Because of the extreme danger of this problem, I am sure the industry will gladly consider any reasonable suggestion which may be helpful in curbing and eradicating this rapidly advancing trouble.

It is because of several years' association with the canning industry of this country in a consulting capacity that I feel I can justly claim some qualification to express unbiassed opinions and suggestions which, I think, will help to overcome this big problem.

I propose to discuss the subject from two angles:

(*a*) The relationship between the canner and the grower (or supplier of raw material).

(*b*) The relationship between the canner and the consumer, or public.

The Canner-Grower Relationship

It is very often cited against an industry that when the supply of its products exceeds the demand, the industry is guilty of over-production. (I feel it would be incorrect to label it as "under-consumption" for the reason that the public already consumes large quantities of canned foods, and it can be educated only at a slow rate to increase its consuming power.)

In considering this charge of over-production, I prefer to qualify it by saying that it is not over-production of canned foods generally, but over-production of those of undesirable quality—foods which should never have been canned because of their own poor quality. In my opinion, one of the remedies to check this most undesirable state of affairs lies in the relationship between the canner and the growers or suppliers of raw material. The suppliers of raw material to the canneries must be made to understand that the best, and only the best, must be submitted, and canners must realise that only the best quality raw material is to be canned, and any material below standard must be rejected. There are, of course, some canneries which are already run on these lines.

Unfortunately, many contractors of raw material formed the habit, during the seasons, of sending to the canneries parcels of fruit or vegetables which were of very mixed quality. Whether it was because many canneries did not wish, or were afraid, to return or reject low-grade material, it was unfortunate that many of them did, after grading, pack almost everything submitted to them in the hope that they would be able to dispose of the low-grade, not-fit-for-National-Mark material under an inferior label at a low price.

Unfortunately, many canneries followed the same line of thought. What was the result? At the end of the season large quantities of cheap low-grade canned foods were available. This fact was, and is to-day, the battering ram used against the industry.

At the close of the season, or possibly earlier, the sales war commences. It is a strange fact that of all the canned products, the cheaper parcels find their way into the channels of consumption first, with the consequence that the markets are soon filled to capacity with canned foods, not the National Mark quality which is the backbone of the industry, but the cheap, low-grade material which undermines the very foundations of the industry.

What happens to the first quality, National Mark products? They remain either in the canneries' warehouses or on the grocers' shelves.

The "Cheap" Peril

There is another aspect to this large-scale disposal of cheap, low-grade products. There is a proportion of the

public which, from circumstances outside its control, purchases cheap foods. In consequence, these cheap canned foods appeal to them, but, in my opinion, this is the wrong type of consumer appeal. This portion of the public is being foolishly educated to consume poor quality foods, and, therefore, to demand cheap-priced foods. They cultivate the bad habit of cheapness. They are being forced away from the better quality products which are those which the industry desires to sell. The industry becomes its own competitor and turns potential customers away from English canned products. It plays into the hands of its competitors the foreign canned fruits, such as peaches, pears, pineapples, etc.

The whole scheme of things is wrong. The ideas of the industry appear to be without rhyme or reason. That is why I feel that if the industry is to embark on a sound and unfailing marketing scheme it must first put its house in order. Growers and other suppliers of raw material must be made to understand that the industry will accept nothing but the best, and not everything that comes off the trees or plants. They must be taught that they will have to do some preliminary grading themselves to remove over-ripe, damaged, diseased material. This, it will be said, costs money. Of course it does. All medicines are nasty to take and cost money.

I realise that there must be some second grade canned products, but I emphasise that the quality should be such that it is National Mark standard. Personally, I feel that the three different sizes covered by National Mark—namely, large, medium, and small—ought to be sufficient to cover all first and second grade foods, and that everything not National Mark should not be accepted in the canneries.

Buying on grade is now being carried out in America with great success. The Americans experienced similar troubles with the supply of raw material to those we are now suffering. They educated the suppliers as to their requirements. This system of buying on grade has been particularly beneficial in the case of fruits and tomatoes. Canners in America buy No. 1 and No. 2 grades only. The rest they do not want and certainly do not accept. The same procedure should apply in this country.

As long as poor quality food is freely allowed to appear on the market I am certain that the industry will always be faced with a serious marketing problem, and its best quality products, those which pay dividends, will remain in the cannery warehouse until the canner is unable to bear the sight of them any longer, and so disposes of them, possibly at a very great loss.

The Canner-Consumer Relationship

As the possessor of an optimistic nature, I need ask no pardon for proceeding to consider my second prescription with the firm conviction that sooner or later this relationship between canner and grower will be properly settled to the benefit of the industry as a whole and the parties concerned.

The problem of the canner now is, not to sell what he has packed, but to increase his output and sell the increase. This undoubtedly involves a scheme in which the relationship between the canner and the consumer has to be considered.

Although a very large proportion of the public in this country consumes canned foods, many of them display a dislike of English canned foods. They remark, "We did not know that you could can such and such", or, "I never eat anything out of a can", forgetting that they have probably partaken during the course of the day of some sardines on toast, or York ham (straight out of the tin), or American fruits or fruit salad. There is thus a large portion of the public in this country, potential consumers of canned foods, which experiences some negative reaction to canned foods in general. This class of public, in my opinion, can be educated to become consumers of canned foods by gentle persuasion in such a manner that once having partaken of these products, it will be a source of astonishment to them how it was they lived without them previously.

Food Value of Canned Goods

At one of the meetings held during the Bristol Convention in 1933 I raised the point that the industry should educate grocers, assistants, and the public as to the valuable food properties of canned foods. I referred particularly to vitamins and mineral salts, and compared canned with so-called "fresh" foods in this respect. I note that Mr. Hirst raised the same point at the last Convention at Leicester.

I am glad to see that in America the Continental Can Company has undertaken the great task of telling the American public all about canned foods and their benefits, and comparing them with "fresh" foods. They are doing this by advertisements in housewives' journals, as well as in other widely read media.

Let us do the same in this country. Tell the public all about ourselves and our products. Individual advertising may be good enough for the individual concerned, but collective advertising is the only beneficial method for the industry as a whole. We want to advertise far and wide the wonderful flavour and appearance possessed by English canned fruits and vegetables. We want to advertise the healthful vitamins and mineral salts contained in our summer packed canned fruits and vegetables, and we want to advertise their convenience, economy, and utility.

There still exist several years old misapprehensions regarding the consumption of canned foods generally, and these must be removed.

I have just returned from a visit to the Continent. I purposely made it my business to consume the foreign canned fruits. There was no possible comparison with our products from the point of view of flavour or appearance. I could class those I personally tasted only as "very poor".

We are proud of our products, so let us tell the public about them.

Let us remove some of those silly notions about "fresh" foods. Let us tell the public that some of their so-called "fresh" foods may be days old; may already have lost a large percentage of their vitamins; may be heavily contaminated with dirt and bacteria, and may

even cost more than the same foods in cans, because of the large proportion of waste.

Canned foods are 100 per cent. utilisable, fresh foods are not. Let us point out how much time, labour, gas, electricity, expense, etc., are involved in preparing fresh foods in the home, and then let us suggest canned foods. What an excellent story waiting for an opportunity!

If the industry of this country is to make any progress this story must be told, and a collective scheme is the only possible way.

Recipes Wanted!

In considering the relationship between canner and public, with a view to increasing consumption, a further idea presents itself. It is the provision of recipes.

I feel that many sales opportunities for canned foods are lost because the public serves up the same products in the same way time after time, until there is a natural reaction against the product and it is dropped for a while.

If it were possible to serve, let us say, plums, one day one way, a second day in another form, and the third day in a totally different form, I am positive that there would be a marked difference in the sales. Too many people open a can of fruit, turn the contents into a dish, and that is the end. What is needed is the easy availability to the public of a book of recipes concerning canned fruits and vegetables, giving at least three different methods of serving up each product. I feel that this would have to be handled by the industry as a whole. The recipes would be compiled by some group of well-known chefs or other persons well versed in the art of culinary presentation. They would have to be economical and easy of preparation. The book would have to be widely and effectively advertised and be available to the public at a very low price, perhaps 3d. It would be advertisement for the industry on a large scale, and a form of advertisement which, I am sure, would not cost a great deal.

The possibility of increasing the public taste for canned fruits and vegetables by means of such a recipe book cannot be fully visualised. We cannot tell to what extent such advertisement would benefit the industry as a whole, but benefit it would surely bring.

Labelling

There is an aspect of the industry which is not treated with the respect it deserves, and that is the question of labelling.

It is most unfortunate that many canners wrap round their products labels which are very poor from the point of view of description, and which really, in the eyes of the Food Laws, "tend to deceive". These canners render themselves liable to prosecution because of misdescription and deceiving the public.

I cannot understand why this question has not been seriously taken up by the "powers that be". I am positive that if canners were made to realise their transgressions with respect to labelling and description it would be better for the industry as a whole. A label on plums or strawberries, etc., on which is the description "Choice" or "Fancy" or some similar qualification, whereas the contents are only second or third grade and broken up, is not only a bad example of mis-description, but also an insult to the industry. There should be a definite ruling with regard to the label, that whatever description there is on it is a true picture of the contents of the can.

At the present time there is a terrific battle going on in America between the canners on the one hand and the American Government on the other concerning this labelling question. There the whole matter of descriptive labelling is being carried almost to the other extreme. I should not like to see the same system adopted here, but I am anxious to see honesty of description and the absence of statements tending to mislead the consumer.

Finally, I come to a point in the industry which concerns, not the actual consumer, but the large-scale buyer of canned foods. This is a subject on which canners seem to act without thought or consideration for the future; it is the question of prices. Without entering into the discussion of the whys and wherefores, canners suddenly take panic and unload their stocks on the market at continually decreasing prices, until they find themselves at the mercy of wholesale buyers who use these falling prices to reduce prices still further.

Canners must infuse some sense into this subject of prices. Profits can never be made by selling below cost, or even at cost. Each canner is entitled to a definite percentage of profit, and to sell below a price which includes this percentage of profit is not only foolish and suicidal on the part of the canner, but is inimical to the industry. Canners who do this are a dangerous source of trouble. They ought either to be removed or heavily penalised.

In considering the position of the industry as it is to-day, it is obvious that all members of it must take stock of the position. If immediate action is not taken to remove these various "infections" the industry as a whole will find itself so overpowered, and its health so seriously impaired, that it is doubtful whether it would ever be able to attain a healthy character in the future.

Rubber in Relation to Foods and Beverages

By T. H. Messenger, M.Sc., A.R.C.S., Read at a Meeting of the Institution of the Rubber Industry

LITERATURE relating to the subject was reviewed in detail, opening with a discussion of the use of purified raw rubber in the manufacture of chewing gum and passing on to the discussion of latex as applied to the preservation of tropical fruit; and in can sealing, as developed by the Dewey and Almy Chemical Co.

Soft vulcanised rubber was considered under the headings: rubber in milking machines; beer, wine, and vinegar hose; bottle rings; jar rings.

Reference was made to the effects of various ingredients on the taste and odour of the foods coming into contact with the rubbers, and suitable compounding ingredients, including accelerators, for the preparation of tasteless and odourless rubbers were mentioned. The cleaning and disinfecting of such goods as milking rubbers and beer hose were reviewed.

Finally, the regulations enacted by various countries to control the composition of these rubbers were summarised.

In the discussion, details were given of the application of hard rubber in equipment handling many kinds of food products, including vinegar and fruit juices.

2,000 Years Ago

Old Wines*

THOSE Wines, which are old, are hurters of ye nerves and of the rest of ye senses, yet are they pleasant to ye taste. Wherefore it is to be avoided by those who have any part weake within. Yet for the use of it in health, both a little is taken without hurt, & that diluted in water. But new wine is inflative, hard of digestion, breeding grievous dreams, ureticall. But that which is of a middle age doth avoid either of these evils, wherefore it is to be chosen in ye uses both of health & sickness. Further, white wine is both thin and soon digested & good for ye stomach. But ye black is thick & hard to digest, heady, and breeding of flesh. But ye Claret being of a middle colour, hath also a midling force to either of these, yet the white is to be chosen both in health & in sickness. And moreover they differ in respect of ye quality.

For the sweet wine doth consist of gross parts & is hard to evaporate, very much puffing up of ye stomach & disturbing of ye belly & ye entrailes, like as the must; yet it doth less inebriate & is convenient for ye bladder & ye kidnies; but ye sharp wine is more ureticall, & a causer both of headache and drunkenness. . . .

The Effects of Wines

But generally all unmixed & simple wine, hard by nature, is warming, easily digested, good for ye stomach, wetting ye appetite, nourishing, soporiferous, inducing a good colour, but being drunk liberally, it helps those which have taken hemlock, or Coriander, . . . or mushrooms & for ye bitings of serpents, & ye strokes of all that by striking or biting do kill by cold or overturn ye stomach. And it is effectuall for ye windiness of long continuance, and ye distension & singultus stomachi, & for ye flux of ye entrails, and of ye belly, & and it is good for sweaters & such as faint thereby, but especially ye white & old & sweet-smelling wines; . . . But the thick black wines are bad for ye stomach, inflative, yet breeding flesh: but the thinner and hard are good for ye stomach, and less breeding flesh; but those which are very old & thin & white, are more ureticall, yet being drank too much, they touch ye sinewy part; but wines of a middle age are best for drinking, as those from seven years. But ye quantity must be ordered by the age, & the time of ye year, & ye custom of ye drinker & ye quality of ye wine. Ye best rule is not to be athirst, & moderately to steep the meat, for all drunkenness & especially that which is continual and pernicious. For ye sinews being besieged day by day at last yield, & ye too much drinking every day, makes an entrance of sharp griefs. But to be drunk moderately for some days, & especially after water drinking is profitable. For it alters ye state of a man in a manner, purging the vapors that annoy ye senses, & opening ye passages secretly. Yet after this drinking of wine you must drink water, for it brings a manner of help for ye avoiding of some malady owing to the drunkenness that lies upon one.

* From *The Greek Herbal of Dioscorides.*—(Translated into English in 1655.)

Correspondence.

MESSRS. FOOD MANUFACTURE,
231-2, STRAND,
LONDON, W.C. 2. *January* 14, 1935.

DEAR SIRS,

I am intensely interested in the article "Improved Methods of Jelly Manufacture", by Mr. G. L. Baker, in your December, 1934, issue. I manufacture several tropical fruit jellies, and it is this viscosity question which I am anxious to get better acquainted with, as the pectin test alone is so varied with our tropical fruits. If you could ask the manufacturers to send me out the pipette you illustrate, I would send a P.O. by return; also any bulletin in connection with the relative viscosity of jellies. You have a small table in your article. In fact, the whole article is most helpful and useful to me. I am writing to the Delaware Agricultural Experiment Station for the two bulletins of reference you mention at the end of your article.

Yours faithfully,
L. DIGBY.

SHERBORNE, WHITE RIVER,
E. TRANSVAAL.

Chemical Supervision in the Canned Foods Industry

THIS was the subject of a paper by D. McKay presented at the Canadian Chemical Convention, held at Toronto during June last, and published in *Canadian Chemistry and Metallurgy* in 1934, p. 204.

The lecturer mentioned that the question was often asked, "How long will canned foods keep?" In spite of being perfectly sterile, if a condition of equilibrium did not exist chemical changes would slowly come about, interfering with flavour, while the loss of vitamins should not be lost sight of.

An important consideration in the canning of any food was to have the raw material as fresh as possible, as with many products changes occur during the first 24 hours which may influence the finished article. Scalding or blanching had many functions, such as removal of undesirable flavours, improvement of colour, removal of mucilage, shrinkage, which facilitated getting a full container and the production of a clear liquor in the can. Also, bacteria were destroyed as well as enzymes, which latter very readily attack broken fruit, etc.

Turning to packages, it was remarked that glass containers were finding increased favour for certain foods, as interaction between the product and metal was avoided, but on the other hand, metal containers were, in several respects, easier to handle. It was mentioned that beer, hitherto packed in glass bottles, was being successfully packed in cans in the United States.

A great part of the work of the chemist in the canning factory was occupied with detecting causes of spoilage, and it was pointed out that frequently canned foods did not receive fair treatment from the hands of the consumer. Usually the trouble was bacterial in origin, and the main difficulty was that by the time the opened can was received, the bacterial flora had altered and increased, and comparison with an unopened tin was not always possible. If, however a sterile can was received for examination, the problem was chemical in nature, and the exact nature of the chemical changes which do take place was still a controversial matter.

★ ★ ★

MOST of the noise these days is being made in print and on the political stage; most of the real change is being effected in the laboratory.—*From the "Chicago Daily News."*

FUNGI FOR FOOD

By A. G. Norman, D.Sc., F.I.C.

(Rothamsted Experimental Station)

THE POSSIBILITY of utilising certain of the fungi as food for man or animals has been seriously considered in recent years. Though to the average person there may seem something distasteful about such a procedure, it is a fact, of course, that one or two fungi are very tasty and much prized by epicures. The common mushroom and the truffle are almost universally appreciated, and several other higher fungi are eaten locally in certain regions. The lower fungi, and particularly the moulds, by which are generally understood a few groups such as the Aspergilli, Penicillia, and Mucors, may not at first appear to be very appetising, though it must not be forgotten that the presence of Penicillia confers on certain cheeses their distinctive and much relished flavours. It is, however, just this lower group, the moulds, the dietary possibilities of which have aroused considerable interest, and this for several reasons, not the least of which is their relatively high protein content.

We are perhaps apt to forget that man and animals are absolutely dependent upon other forms of life for their supply of protein. In this sense the animal world is parasitic on the plant world. We regard the plant as a very efficient machine for the production of carbohydrates—cellulose and starch—from simple raw materials, namely atmospheric CO_2 and water, by the agency of chlorophyll. But in addition the plant elaborates protein from the same simple raw materials, together with nitrate or ammonia taken up from the soil. When the animal ingests and digests this protein it may break it down to the constituent amino-acids, and later rearrange them, synthesising protein again. The first step of forming the amino-acids is one which the animal mechanism is unable to accomplish.

Protein Synthesis by Fungi

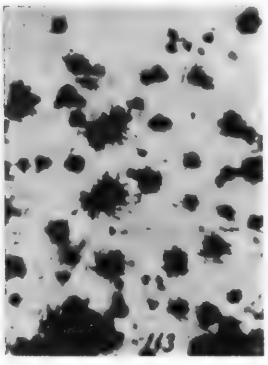
Apart from the higher green plants, however, lower organisms also are able to accomplish this synthesis of amino-acids and proteins from simple substances. The algæ employ the same raw materials as the green plant, deriving from sunlight the necessary energy for building them up, but bacteria and fungi require first to be presented with some available energy source such as a carbohydrate, and then from inorganic nitrogen can build up protein substances required for their growth.

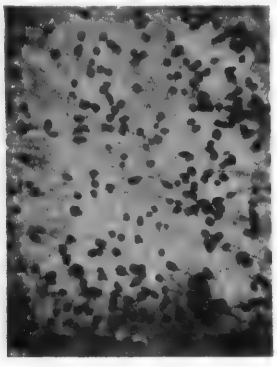
Protein is the most expensive essential dietary constituent, and the one which is apt to become short under conditions of famine or blockade. Might it be possible, therefore, to supplement the protein supplies by employing the lower organisms as food, either for man or animals? Or further, is there any particular constituent of microbial material which could be used for food? A very considerable amount of research has been carried out on this question in Japan, where the food problem, and particularly the protein problem, is especially acute.

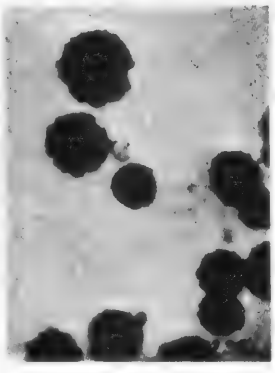
In a small and indirect way, such a utilisation was actually carried out in Germany during the closing days of the world war. To straw (which is ordinarily low in protein) was added a small amount of an ammonium salt in solution and a culture of the mould *Aspergillus fumigatus*. This grew by utilising the straw carbohydrates and produced a good growth of mycelium, thereby raising the protein content from 1 to 7 or 8 per cent. The mouldy straw was dried and fed experimentally to sheep and cattle. It was found that 40 per cent. of the protein elaborated by the mould was assimilated by the sheep. This somewhat crude experiment might easily be improved upon, but at least it serves to show the possibilities of employing the protein synthesising action of micro-organisms in the production of food.

The growth of micro-organisms on a large scale is by no means insuperably difficult; indeed, one organism,

namely yeast, is produced in very considerable quantities for use in brewing and baking. On account of the high vitamin content of yeast, various preparations of it have been put on the market, though these can hardly be classed as foods in the sense in which the word is employed in this article. In the U.S.A. it is common to find in "cafeterias" and restaurants small packages of fresh yeast on sale, wrapped in foil. An extensive advertising campaign urges the eating of a packet before or at the end of the meal to assist digestion. It is perhaps the therapeutic rather than the nutritive value which is stressed, but the latter might repay attention.







ABOVE: **Left, *Aspergillus oryzæ*; right, *Aspergillus fumigatus*.**

BELOW: ***Aspergillus niger*.**

Magnification × 110 approx.

(From *The Aspergilli*, by Thom and Church. Photomicrographs by Keenan.)

Liquid Culture

Many fungi may be grown readily in liquid culture; such are all those the mycelium of which develops into a thick, close "weft" or mat on the surface. This mat may easily be removed and washed. The culture of this type of organism on an industrial scale has been successfully employed for the production of citric acid, using *Aspergillus niger*. In this case, of course, it is the residual liquid under the mycelial weft which is of value. Moulds have also been grown on a large scale for the preparation of enzymes. The well-known "takadiastase" is prepared from *Aspergillus oryzæ* in this way. Most of the research work on the culture of moulds has hitherto been concerned with the fermentation products found in the solution, and very little with the fungus itself. In this country, for example, a very elaborate survey of fungal metabolic activities has been made by Imperial Chemical Industries, Ltd., and this work is being continued by Professor Raistrick at the London School of Hygiene and Tropical Medicine. In two institutions abroad, however, one in the U.S.A. at Wisconsin, and one in Japan, the composition of the fungus itself has been the prime object of investigation, and conditions have been studied whereby the maximum yield of fungal tissue might be obtained, rather than any metabolic products of its growth.

Composition of Fungus Tissue

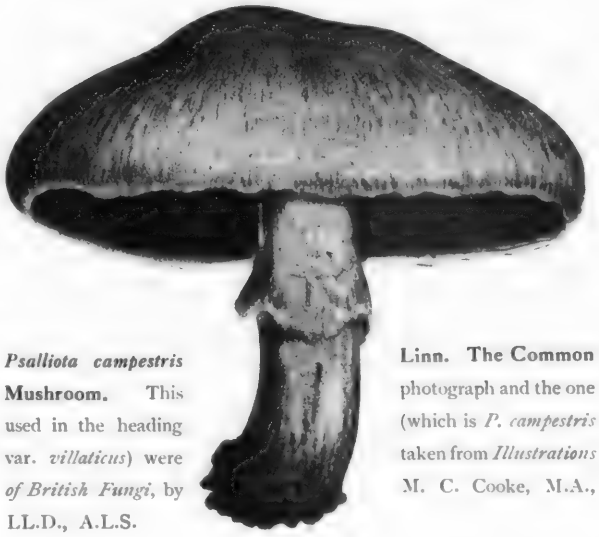
The chemistry of fungus tissue has proved to be difficult. Micro-organisms have always been regarded as within the general field of botany, and botanists who have examined fungi have described their composition in terms of plant constituents, often on unreliable staining evidence only. The literature, therefore, contains such names as fungal starch, spore starch, cellulose, callose, without in most cases any real knowledge of their composition.

The chemistry of fungal tissue has an individuality of its own, and while it differs in numerous respects from that of both plant and animal tissues, it more nearly approaches that of the latter than of the former. Proteins and fats are generally present in much larger quantities than in ordinary plant material. In a large number of fungi grown on a liquid medium of glucose and inorganic salts, with nitrogen supplied as ammonium nitrate, the following major groups of constituents were estimated approximately.

Protein (N × 6·25)	varied from	43·14 %	with average of	32 %
Fats and lipoids	,, ,,	20·1 %	,, ,,	6 %
Carbohydrate	,, ,,	80·47 %	,, ,,	58 %
Ash	,, ,,	9·3 %	,, ,,	5 %

The yield of fungus tissue obtainable varies, of course, with the organism and the conditions of growth, but in favourable circumstances it amounts to about one-third of the sugar fermented. That is to say, from 10 lb. of glucose about 3 lb. of fungus could be obtained, about 1 lb. of which would be protein.

The chief structural constituent of the lower fungi does not appear to be cellulose, but instead there is present a form of chitin, very similar to that found in Crustaceans in that it contains acetyl glucosamine. This chitin accounts for 15 to 20 per cent. of the whole. The remaining carbohydrates fall into two groups, water-soluble and alkali-soluble, the latter usually being quantitatively the

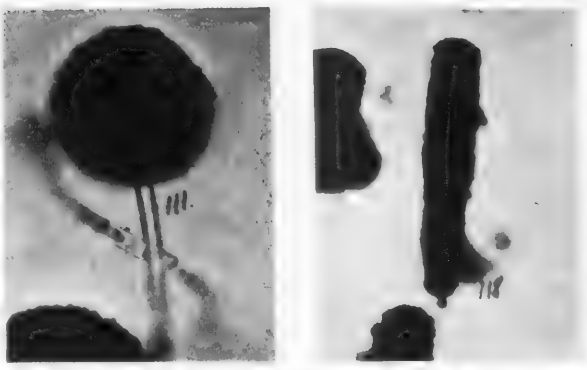


***Psalliota campestris* Linn. The Common Mushroom.** This photograph and the one used in the heading (which is *P. campestris* var. *villaticus*) were taken from *Illustrations of British Fungi*, by M. C. Cooke, M.A., LL.D., A.L.S.

more important. All the carbohydrate preparations from lower fungi have turned out to be glucose polysaccharides. This appears to be the case whatever the medium upon which the mould is grown. If supplied with a pentose sugar, or another hexose, such as galactose, the organism can transform this into glucose.

The fatty constituents of fungi are usually regarded as being reserve materials, though there is some doubt on this point. In most cases there is a considerable amount of free fatty acid, which may account for as much as three-quarters of the total amount. In general, the percentage of free fatty acid is high in those cases in which the percentage of total fatty material is low. One constituent of the fatty fraction that has aroused interest lately is the sterol group, and in particular, ergosterol, which has been shown to be present in moulds to an appreciable amount. Sterols on exposure to ultra-violet light give vitamin D, and on a large number of mould samples the sterol content has been found to average about 0·75 per cent. Mould tissue could therefore be used as a source of ergosterol, or if irradiated would be potent in antirachitic properties.

The proteins of moulds are exceptionally difficult to isolate, and appear to be rather different in character from those of plant and animal materials. Such as have been obtained have been rather low in nitrogen content.



Left, *Aspergillus niger*. Right, *Aspergillus fumigatus*. Magnification × 260.

(From *The Aspergilli*, by Thom and Church. Photomicrographs by Keenan.)

A water extract removes some nitrogenous material of a peptide nature, not as complicated as protein.

Fungal Tissue in Foods

Feeding trials with mould tissue have shown that alone it is not capable of maintaining body weight in rats, but with the addition of small amounts of dried yeast or casein, normal growth takes place. This suggests the absence of certain essential amino-acids or their presence in too low a proportion to bring about normal growth at the ordinary level of protein intake. A high percentage of the protein is apparently utilised by the animal.

From these investigations there seems to be no reason why such fungal tissue should not be used as food for animals, if supplemented by a certain amount of other protein material in the ration. Information appears to be lacking at present as to the availability of the carbohydrate constituents, but in any case the chief value of this material, as pointed out earlier, would lie in the protein supplied. As far as value for human food is concerned it is probable that the same conclusions may be drawn. Fungal tissue would not be likely to prove a very delectable dish if served directly, but as an ingredient in manufactured foods, or in some type of flour, might find a use in times of emergency.

CHEMICAL ENGINEERING 100 YEARS AGO

Centenary of George Scott and Son (London) Limited

Operations such as evaporation and distillation which have been practised by man for longer than we should care to estimate are essentially chemical engineering. But it was not until the industrial revolution a hundred years or so ago that chemistry and engineering began to grow interdependent with the large-scale production of chemical substances.

At that time, in 1834 to be exact, George Scott, an engineer, founded the business now known as George Scott and Son (London), Ltd., the Chemical Engineers.

In that year the manufacture of heavy chemicals was practically limited to sulphuric acid and soda. The word explosives could only be linked with gunpowder. There was no dyestuffs industry and no fertiliser industry. Some paints and varnishes were manufactured and also some soap. But to quote from the brochure that has just been published by this illustrious company in commemoration of the centenary of its existence and progress, entitled *One Hundred Years of Chemical Engineering* 1834-1934, there was another important and flourishing industry, the sugar refining industry, with which the founder of the firm, George Scott, was intimately connected. This industry, we are told, has been the source of important advances in chemical engineering, and the founder's early connection with it has been responsible for the fundamental improvements that have been contributed by this firm to the design of evaporating plant.

Early products of the firm include an amazingly large number of appliances, Vacuum Pumps, Sugar Cutting and Crushing Machinery, Edge-runner Mills and Grinding Machines. At a later date Filter Presses and Centrifugals were manufactured, until Frank Scott, son of the founder, joined the business in 1851 and commenced the making of Air Compressors and Blowing Engines. All of these names and the types of equipment they indicate are in familiar use in the sugar refining, brewing, oil refining, soap making, glycerin refining, paint manufacturing and allied industries, which were well served by this Company in its early days, as they are to-day.

About 1890 the Company designed and constructed a Solvent Extraction Plant which is claimed to be the forerunner of all Continuous Solvent Extraction Apparatus; whilst in the same year they constructed for Lever Bros., Ltd., the First Triple Effect Evaporator to be installed for the concentration of glycerin. The recovery of by-products in various industries has also received their expert attention.

The brochure, which is divided into observations retrospective and prospective, is of considerable historical interest and should be read by everyone from this point of view, quite apart from the information that is given at the end regarding the present-day productions of the Company, which comprise Drying and Evaporating Plant, Milk Condensing Plant, Milk Heaters and Vacuum Band Dryers, Fish Offal Reduction Plant, Solvent Extraction Plant, Oil Refining Plant, etc.

We owe more than a little gratitude to Messrs. George Scott and Son for the interest they have always shown in us. We congratulate them upon attaining their centenary, and wish them continued prosperity. W. L. H.

TINPLATE RESEARCHES

Published by the

International Tin Research and Development Council

The Nature of the Coating on Tinplate

NEW evidence as to the nature of the bond between the steel and the tin coating on tinplate are contained in *Tinplate: Some Fundamental Considerations*, by W. E. Hoare, now issued as Number 14, Series A, of the Technical Publications of the International Tin Research and Development Council.

Recent researches have established the properties and characteristics of the iron-tin compound $FeSn_2$. Removal from tinplate of unalloyed tin by a selective reagent is known to be without effect on this compound, leaving a thin layer which answers all the tests for $FeSn_2$ firmly attached to the steel base. The amount of alloyed layer observed under the microscope agrees closely with that computed from the chemical methods of other investigators.

In tinplate manufacture the consistently short times during which conditions necessary for compound formation are realised, and the known slow rate of combination once a thin layer has been formed, result in a layer of compound being of a thickness which is approximately constant and unaffected by the quantity of unalloyed tin covering it.

In this connection the effect on compound growth of long period annealings both below and above the melting point of tin is referred to and illustrated by photomicrographs.

The tinning process is analysed into a succession of reactions from which it is deduced that imperfections in the coating will be:

1. True pores, extending through both the tin and alloy layers to the steel.

2. Potential pores, where only the compound layer is exposed through the stripping of the tin in the later stages of the tinning process.

Grease lines and mottle defects are discussed from the latter point of view. The presence of the compound in the defect called "scruffy" is mentioned, and it is shown how it may result from the interaction of iron and molten tin under working conditions.

Peculiarities of Yellow Stain on Tinplate

A SCIENTIFIC study of the yellow stain that sometimes forms on tinplate during storage has been carried out by C. E. Beynon and C. J. Leadbeater at University College, Swansea, under the supervision of Professor C. A. Edwards, for the Research Committee of the South Wales Tinplate Association. In view of its direct value to the industry, the work has been published by the International Tin Research and Development Council as Technical Publication, Series D, Number 1.

Yellow stain is due to a type of surface oxidation which is electrolytic in character and intimately related to the conditions under which sheets are stored. The essential condition for its manifestation is that there should be comparatively free access of air to one part of the sheet and restricted access only at some other. Yellow stain occurs where access of air is restricted—that is, at the middle of the sheets rather than the edges, and at the bottom of a heavy stack more than at the top, where the sheets are not pressed into such close contact.

Lithographing difficulties are not due to yellow stain alone. Degreasing, which does not remove the stain, enables sheets to be printed without trouble. A cathodic reduction treatment has been devised, which rapidly removes the grease and the stain from sheets, which then print normally. It is suggested that removal of grease from tinplate by solvent vapour would be more efficient than the usual mechanical method, although it is not yet known whether this would tend to prevent yellow stain.

Measuring the Porosity of Tinned Steel

SINCE the quality of tin coatings is judged largely by their porosity it is essential that the means of detecting and assessing the extent of this defect should be indisputably reliable. The International Tin Research and Development Council has just issued the results of further researches undertaken with this object in view, in a technical publication, Series A, Number 7, *The Determination of the Porosity of Tin Coatings on Steel*, by D. J. Macnaughton, S. G. Clarke, and J. C. Prytherch.

The earlier paper by the same authors (*J. Iron and Steel Inst.*, 1932, **125**, 159) described improvements in the technique of the ferricyanide method and a new method called the hot-water test. Degreasing prior to testing has, in the interim, been shown to be of extreme importance, and two methods are now given which remove the grease without affecting the porosity. The first method described consists of a one-minute immersion in a boiling solution of ordinary water-glass (sodium disilicate) of about 1 per cent. strength after carbon tetrachloride treatment. Metasilicate should not be used as it attacks tin.

In the second method a four-volt battery is connected by its negative pole to the sample immersed in a cold ½ per cent. sodium carbonate solution, the anodes being sheets of nickel or the bath itself, if of iron. One minute is usually sufficient thoroughly to degrease ordinary commercial tinplate. Isolated examples that resist complete degreasing in the above way are treated first with carbon tetrachloride and brushed over with a varnish thinned with solvent, when, after drying, the cathodic treatment removes the whole film of varnish and grease together. Thorough rinsing in running water follows after either method.

Both the hot-water and the ferricyanide-paper tests are described in full practical detail, and photographs of the results of the hot-water tests on a selection of specimens are included. An appendix summarises the tests which confirm that the degreasing methods do not aggravate porosity.

SYNTHETIC HONEY

"HONEY is principally a mixture of two sugars which can be prepared artificially from cane sugar", said Dr. L. H. Lampitt recently. "The flavouring comes from the flowers from which the bee collects the nectar.

"I do not know of any special dietetic attribute of natural honey which will not be provided by the artificial mixture", he added, "yet I consider it wrong that the word 'honey' should be attached to any foodstuff which does not contain the natural product of the hive."

PLACING HEAVY MACHINERY

AN ingenious idea from the other side of the Atlantic will probably interest a number of our readers. Attention is drawn to the difficulty often experienced in accurately lining up heavy machinery, and it is suggested that after roughly placing in position, the machines should be mounted on blocks of ice. Minute adjustments of position can then be made very readily, and the ice in due course melts and the water evaporates, thus solving the problem of removing the supports from very difficultly accessible spots.

THE TRAINING OF THE FOOD TECHNOLOGIST

By

H. B. Cronshaw, B.A., Ph.D., A.I.C.*

Technical Institutes

ONE IMPORTANT aspect of these considerations is that it excludes from the range of this discussion the type of instruction which is provided by the many excellent technical institutes which exist in this country. For example, we are fortunate in having several highly organised centres of craftsmanship in bread making and confectionery, and in subjects connected with the meat trades. One may instance as outstanding examples the National School of Bakery here in London, which is under the direction of Mr. E. B. Bennion, and the Smithfield Meat Trades Institute under Mr. W. H. Nevell. Although these are essentially centres of trade instruction, their resources are such as to provide adequate facilities for advanced, specialised studies and even research.

However, the point is that the main object of these institutes is not to produce men who are qualified to fill the higher executive or research positions, but rather to turn out intelligent craftsmen and departmental managers. Their training is too specialised and too inadequate on broad, scientific lines to qualify them as food technologists according to the requirements defined in this paper. In any case, there is no necessity, and in fact it would not be desirable, for departmental managers and foremen to have had a scientific training at the university. They are fully occupied with the routine of production as laid down by the technologist. It is the latter who should act as the channel for new ideas and methods, assimilating and sifting the results of research, but before he can test out under works conditions those that are likely to prove useful, it is essential for him to obtain the foreman's co-operation, and this can best be done by explaining the matter in such terms as he is able to understand.

This is a convenient point at which to refer to an experiment in education on somewhat different lines. At one technical institute there is a course of lectures, each of one hour a week, extending through the winter session, on the Chemistry and Manufacture of Foodstuffs, and also one of twenty lectures coupled with practical work in the Bacteriology and Microbiology of Foodstuffs. There are other more extensive courses on Refrigeration Engineering, including the cold storage of foodstuffs. I have had no personal experience of these courses, but they have been somewhat unkindly referred to as a "gargantuan repast". Another critic stated that "it would be just as good to present each student with an *Encyclopædia Britannica* and six months in which to digest it". At any rate, those who did survive this ordeal might be tempted to follow the example of a certain Herr Doktor who, when asked what kind of a chemist he was, replied, "Ich bin ein Methylenblau Chemiker".

* *Continued from previous issue.*

Other Technologies

It is perfectly clear, then, that the manufacture and preservation of foodstuffs is one in which science plays an even more vital part than in any other field of industrial activity. Consequently one would expect to find a proportionately greater demand for technologists of the right kind. That this is in fact the case so far as the quantitative aspect of the demand is concerned is evident from a statement made by Sir George Newman in the Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1932: "Whereas 50 years ago it was the rarest thing for a food manufacturer to employ a chemist, now every factory of any consequence is equipped with its research laboratory, and there are actually more chemists employed in the various branches of the food industry than in any other single industry in the country".

Yet in spite of the fact that the complex nature of the raw materials and the processes involved in their factory manipulation call for the application of a particularly high order of scientific ability, little or no thought appears to have been given to a consideration of what constitutes the right kind of technologist who should be forthcoming to meet this demand and the means by which he is to be produced.

Point is added to this question when one notes the almost palatial accommodation which has been provided in universities and science schools up and down the country for the technology of practically every branch of industry; that of foodstuffs is the sole exception. One might be led to infer that bricks and pots, for example, are more vital to the general welfare and prosperity of the nation than are its foodstuffs, or that there is more science in the making of a sauce bottle than there is in its contents. Yet we know quite well that this is not the case. Rather is it nearer the truth to say that the study of sauces from a physical-chemical point of view is of so erudite a character that it is beyond the range of anything less than extraordinary ability and learning. No doubt one of the main reasons for the persistence of unadulterated craftsmanship in the baking and confectionery industry is the very complexity of the scientific problems which are involved. Anyone who has observed the parallelism between the physical-chemical

principles involved in the manufacture of glass and of sugar confectionery will be the last to deny that the latter is a much more abstruse subject for study than the former, or to say that the baking of bricks and pots presents anything like the intricate problems which arise out of bread and cake baking, although, here again, many of the basic principles are common to the two groups of products. Even cooking has been likened to brick making in that both are examples of arrested reactions; if you do not arrest the reaction soon enough you are left with a lump of glass in one case and a lump of coke in the other—both useful products, but not the ones you are aiming at.

In this connection it is instructive to recall the pioneering days of Dr. J. W. Mellor's work among the Staffordshire potters, for to him is due the credit of having elevated the clay industries from the stagnation of blind craftsmanship and family recipes to that of an occupation which has become amenable to scientific treatment. Actually, the first seed was planted by a man of literary rather than of scientific culture, Sir Graham Balfour, who was then Director of Education for Staffordshire; it was he who had the vision to appoint a scientist to the task of rationalising the clay industries. That Dr. Mellor was of the same turn of mind is illustrated by an advertisement which appeared in *Nature* for a chief assistant who must be a physical chemist, preferably without any knowledge of the industry! They started with a perfectly clean slate and their policy has been brilliantly justified.

The point about this reference to the clay industries is that it provides a good example of what can be achieved under the ideal conditions of a highly localised industry —even though it be hopelessly conservative and anti-scientific—and the conjoint development of research and education. The school at Stoke-on-Trent housed research workers, teaching staff, and the Ceramic Society all under one roof. Much the same plan was followed by Professor Turner at the Sheffield School of Glass Technology, and one could name a number of other examples.

On the other hand, provision for the training of petroleum technologists was made in response to a sudden urgent demand for technical specialists from within the industry itself, a demand which was brought about by a phenomenal expansion of British interests in the production and treatment of petroleum and by the fact that the control of these interests came to be placed very largely under the influence of a man who had abandoned the quiet seclusion of the classroom for the more rigorous elements of the outside world. I refer, of course, to Sir John Cadman. No doubt the same end would have been reached if he had decided to stay in his classroom, but it would not have been done so well or so quickly, in spite of the ideal conditions that so suddenly shaped themselves in the form of a spontaneous demand by a young, vigorous industry. His was a very much easier task than grafting science on to an ancient industry that stubbornly resists the operation.

This shows that whatever the initial conditions may be —ranging from bad as in the case of clay to good as in the case of petroleum—little or nothing will be done unless somebody assumes the rôle of missionary, and that is why I commend the present matter to the attention of the Food Group.

The Food Industry

The food industry in its relation to education stands in a somewhat anomalous position. Although it is sharply marked off from other industries by the biological, and therefore perishable, nature of its raw materials, and by the fact that its products are intended for human consumption, it is actually not a simple unit but a whole group of more or less independent industries. Sometimes, of course, several may be gathered under one factory roof, but more frequently they are run as separate concerns. We have, for example, the manufacture of meat products, fish products, sweets, bread, margarine, infant and breakfast foods, biscuits, jam, confectionery, chocolate, pickles, canned fruit and vegetables, and so on, each of which in itself constitutes an important, specialised occupation. Then there are other concerns occupied with the storage and distribution of certain foodstuffs. The result is that any interest in educational matters which might be stimulated in industrial circles is likely to be self-centred and parochial. The problem is to find common ground. That, however, is not difficult when the viewpoint is shifted over to the scientific side, as will be done in what follows. The real difficulty lies in getting the various factions to shift their viewpoint also.

Another obstacle is the geographical distribution of the food industries. They are not concentrated into any particular area, as is commonly the case with other industries, but they are scattered over the whole country. This, coupled with their diversity, is not conducive to any local intensification of interest in the matter of training food technologists. On the other hand, national research of a fundamental character has now been pursued to the extent that the food industries should be calling for men qualified to translate the results into practice. It is all very well for the research laboratories to be working overtime, but if no one has thought of organising a body of young men qualified to distribute this research material among those for whom it is intended, the labour of production defeats its own ends. The availability of the results of research is just as important as their production. The fact that one and the same person cannot conveniently produce and distribute is in itself a strong argument in favour of making some provision for the training of technologists who will be capable of translating laboratory data into works practice. This matter of education is therefore of as vital importance to national research bodies as it is to the industry which is helping to pay for and hoping to benefit from their work.

Reference has been made to the difficulty of unifying the multiplicity of self-interests which are presented by the composite nature of that group of more or less commercially independent industries embraced within the general term "food industry". Fortunately, from our point of view, this is not a matter of material concern.

(*To be continued.*)

EXAMINATION OF CANNED FOODS

The following is a summary of a paper read by W. S. Walton, M.D., D.P.H., Deputy Medical Officer of Health for Plymouth, at a meeting of the Royal Sanitary Institute held at Plymouth on February 22. The summary is followed by an expression of other views on the subject of Dr. Walton's paper.

DR. WALTON opened his address by reference to the rapid growth of the canning industry of Great Britain, which has increased its annual production from 8 to over 80 million tins of food from 1927 to 1931, and it is estimated that nearly 200 million tins of food were produced in 1934.

The products of the larger canning concerns are nearly always of irreproachable quality, but there are less responsible firms who may be tempted to put on the market an article whose quality is not altogether above suspicion. Hence arises the necessity for developing a technique for the examination of canned foods by the public health authorities.

Dr. Walton has had considerable experience in this kind of work and his investigation of 600 tins has led him to name the following features as those upon which most reliance may be placed:

(1) Palpation.
(2) Percussion.
(3) General appearance.
(4) X-ray investigation in specified instances. Internal examination may be resorted to for confirmatory purposes.

Blown cans offer no difficulty to the examiner. The "springer" type is the main stumbling block in his path; according to most importers or dealers, it is harmless, but a scrupulous examiner looks upon it as a potential source of trouble. Dr. Walton is inclined to believe that if the consignment is of a uniformly good standard, a few "springers" may be regarded as harmless, but he would X-ray one or two if there were any grounds for suspicion. On the other hand, "springers" found among a consignment containing many blown cans must be looked upon with suspicion.

Dr. Walton then enumerated the desirable features in an efficient container, which are:

(1) Use of suitably tempered steel with a uniform coating of tin.
(2) Well-made can body.
(3) Accurate joining of the ends of metal forming the side seam.
(4) Efficient double-seamed joints of the covers.
(5) Use of a lacquer coating in the case of certain fruits.

Obviously, faulty construction increases the liability to outside contamination. The weak points of a can are therefore the cover seams, the side seams, and the continuity of the metal itself.

Legal Aspects of Inspection

Dr. Walton proceeded to name the following legal provisions which may have a bearing on the inspection of canned foods:

(1) Public Health Act, 1875	The familiar sections 117, 118, 119, etc.
(2) Public Health Acts (Amendment) Act, 1890	Section 28.
(3) Food and Drugs (Adulteration) Act, 1928 ...	It is worth noting that one of the specific references to canned foods, as such, is found under section 16 of this Act, which relates to the sampling of food or drug in an unopened tin. The sample may not be obtained otherwise than in an unopened tin, in which it is contained.
(4) Public Health (Regulations as to Food) Act, 1907.	
(5) Milk and Dairies (Consolidation) Act, 1915.	
(6) Preservatives in Foods Regulations, 1925 ...	Particularly regarding tinned fruit pulp, etc., as to its sulphur dioxide content.
(7) Public Health (Imported Food) Regulations, 1925	An interesting feature of these regulations is the provision of a definite time for retention of articles of food, pending completion of special examinations which a medical officer of health may desire.
(8) The Various Public Health Regulations as to Milk	Condensed milk, dried milk, imported milk Regulations, etc.

We should, however, at this point like to draw Dr. Walton's attention to his statement under clause (3) which reads, "The sample may not be obtained otherwise than in an unopened tin, in which it is contained". Since there might be some misunderstanding over the interpretation of this, we quote the complete statement from which it is drawn: "Provided that, where any article of food or drug is exposed for sale in an unopened tin or package duly labelled no person shall be required to sell it except in the unopened tin or package in which it is contained".

General Methods of Examination

Dr. Walton then referred to the following table summarising the methods applied to the examination of canned foods which are at the disposal of an examiner:

Methods Applied to the Examination of Canned Foods

External.			General condition of the tin—rust, leaks, etc.
		Inspection.	Label — information, history of consignment.
			Visible bulging—extent.
			Integrity of cover and side seams, solder.
			Signs of injury—indentations and perforations.
		Palpation.	Resistance of covers to finger pressure.
	Physical.	Percussion.	Dullness or resonance.
		Shake.	Of use chiefly with meat foods.
		Vacuum.	Measured by special instrument (Vakuometer).
Internal.			Gas escape on opening—headspace.
	Physical.	Inspection.	Appearance of content—colour, consistency.
			Appearance of inner surface of container.
			Taste and odour.
			Acidity or H ion concentration.
		Chemical.	Presence of metals—tin, iron, lead.
			Presence of preservative.
			Analysis of gas formed.
	Special.	—	
			Presence of Specific Bacteria—aerobes, anaerobes and gas formers.
		Bacterial.	Presence of toxins—inoculation tests.

To these he added the method of radiography which he has developed and which is discussed below.

Inspection of External Attributes

The following observations relating to the inspection of internal and external attributes have been abstracted in full from Dr. Walton's paper:

Label.—The following information should be noted, if possible: nature and grade of content, manufacturer's name and address, date and place of canning. Excessive application of adhesive paste may lead to presence of rust on container corresponding to the area of the label.

Container.—The covers and sides are scanned for traces of rust, leaks or perforations, and for signs of damage and bulging. The "crimped or double seamed joint" between the cover and body of the tin should be carefully inspected. The safety valve or pulse of the tin is to be found at each end in the slightly elastic expansion rings of the cover. The covers, therefore, whether internal pressure is due to displacement or indentations, overfilling of content, or from formation of gas, will show signs and degrees of bulging in accordance with that internal pressure. Any signs of bulging must be carefully investigated to determine the cause of internal pressure.

Rust.—The presence of rust on the exterior of a tin may mean little or much. Dampness may ensue during storage or in course of transit; it may arise from leakage or it may be due to defective labelling. Careful inspection of packing cases and enquiries as to the mode of transit are necessary factors to be considered before coming to a decision. Rust is the danger signal for possible future corrosion and perforations. Containers which show fractures, perforations, or leaking joints are to be condemned immediately.

Palpation.—Tins, the ends of which have a firm feel and no "give", usually possess a good vacuum. Should it be possible to transfer a bulge from one end of the can to the other by pressure, or should it be possible to reduce a bulge by the fingers so that the lid remains flat after the pressure is withdrawn, then the tin is regarded as a "springer" and is treated with suspicion. In "springers" a small pressure exists and bulges one or both ends slightly, but this pressure is not sufficient to sustain the bulge against finger pressure. When the ends are irreducible by finger pressure, the term "swell" or "blown" is applied to the tin. Palpation thus conveys through our sense of touch an estimate of the pressure existing within a tin, and is one of the most valuable of the tests at our disposal.

It would be as well to indicate at this stage a few fallacies which exist in connection with the causes of pressure within tins. When pressure is diagnosed, the first impression is that it is due to gas formation by organisms and that the tin should be rejected. The following conditions in a tin stimulate pressure symptoms:

(1) Overfilling.
(2) Damage such as indentations bulging out the ends.
(3) Hydrogen swells.
(4) Leaks, which may give "air note" in the percussion examination.
(5) Special containers—*e.g.*, those used for sardines—have a naturally "puffy" feel.

Conditions (2) and (4) may be recognised by inspection, while the conditions cited under (3) and (5) occur only with certain materials. The first state is associated with dull percussion note and thus is distinguished from pressure due to gas formation.

Percussion and Shake Tests.—These well-known tests have their most useful application in connection with meat foods. The former depends on difference between the resonance or dullness elicited. A possible source of error to be guarded against is that an over-filled tin will give a dull note as well as one with a solid meat pack and good vacuum. The dullness in an over-filled can is general all over the tin. An under-filled tin may give a comparatively tympanitic note, but the shortage of weight is usually apparent. Tests for degree of vacuum may be made by use of an instrument known as a vakuometer. Its use is mainly of a technical nature.

Internal Examination

Internal examination or "appeal to the tin", the final and empiric test, is rarely employed except in experimental work. Points worthy of attention are—fill of the can, amount of headspace, consistency, smell and colour of content as compared with a sound product of its kind, presence of bubbles of fermentation. The inner surface of the container should be examined for traces

of corrosion, perforation, and staining. Taste, as a method of investigation, is exercised with due discretion.

Chemical Methods.—Much has been written concerning hydrogen ion concentration and *p*H indicator papers may be used, but determination of acidity does not materially assist one. Analysis of gases evolved is chiefly of technical interest, although analysis of content for presence of metals and preservation will be called for in special cases.

Hydrogen Swells.—The solvent action of certain fruits on metal containers leads to electrolytic action with the evolution of hydrogen which may lead to "blowing" of the tin. The condition occurs in this country only when tins are stored in warm surroundings. The actual spoilage which occurs is generally negligible, but so closely does the condition resemble that of "blowing" from effects of decomposition, that condemnation of such tins is accepted generally.

The influence of temperature upon "springer" tins is worthy of note. On cold days "springer" tins may appear normal, but the "knocking" test will eliminate any fallacy in that connection. Alternatively, at high altitudes, internal pressure in tins is apt to show itself more than normally on account of diminished barometric pressure.

X-Ray Investigations

Dr. Walton then went on to give an account of the application of X-ray methods as an aid to the examination of canned foods. He referred to the dangers of over-reliance on methods based upon sense impressions in the work of examination. For instance, percussion, palpation, and shake tests might give very different results at the hands of a zealous inspector or, alternatively, at the hands of an importer. This consideration has led him to search for new methods which would obviate the human factor, and hence to the application of the X-ray method, which has been successfully used in the industrial examination of other products. As there was no previous experience of radiographing canned materials, he had to develop his own technique.

In his paper to the Royal Sanitary Institute he gave an account of the considerations which are involved in this technique, and then he enumerated the advantages of the radiographic method, which were stated to be:

(1) A permanent record is available for inspection by anyone and may be of use in legal proceedings.

(2) The tin is not opened and if deemed to be sound is available to the trade and its price saved.

(3) An opinion may be vouched more quickly than in detailed internal inspection.

(4) The personal error is more nearly eliminated than in the percussion, palpation, and shake tests.

Dr. Walton displayed selected films from his collection illustrating the points he had made.

Conclusions

The conclusions arrived at were that radiology would give definite information on the following points:

(1) *Condition of the Container*.—Condition of the container itself, including bulging of the covers and presence of rust, indentations, corrosion, and perforations, together with the state of cover seam and soldered side seams.

(2) *Amount and Nature of Headspace*.—The extent of the headspace within a tin is readily discerned by the films. Deeper headspaces than usual are due either to insufficient filling with a defective vacuum or to the formation of gas within the tin. Dr. Walton's experiments with the tyre pump and Schrader valve showed that increase of gaseous pressure within the tin leads to increased radioparency of the headspace and the meniscus of fluid or semi-fluid level is more sharply defined. The definition of the meniscus indicates the degree of internal pressure existing; ill defined menisci are associated with vacuum and low positive pressures, while increasing pressure shows the line of demarcation between headspace and content the more clearly.

(3) *Condition of Content*.—In the "sound" series of tins the medium was usually homogeneous with little or no changes of density visible, while in the "unsound" series homogeneity was poor and detail of content more expressed. Gas patches showed up in the second or unsound series. An experiment of great interest was the inoculation of a tin containing solid media with a *B. coli* culture and the subsequent production of gas as revealed by successive films. The radioparency of gas and air is well demonstrated in the study of pneumothorax films in chest radiography. The presence of gas or air shows up the demarcation of neighbouring structures alike in the radiography of chests or of tins.

X-ray cannot be used as a routine under present circumstances. The best application of radiology is in assessing a consignment which contains a proportion of doubtful "springers" and in cases where there is more than the normal amount of dispute as to the wholesomeness of the content. Television reproduction of films may, in the near future, save much vitriolic correspondence with distant consignors.

The Discussion

The paper was followed by a discussion, in the course of which reference was made to considerations of expense involved in using the X-ray method, availability of the plant, and hydrogen swells in relation to the X-ray method. Dr. Walton, in closing the discussion, said that the technique of the X-ray method was by no means fully explored yet and that he had not been able to devote more than limited attention to the subject owing to restrictions imposed by questions of cost and time. He pointed out that the cost of routine examination may yet become much lower and, as regards availability of the plant, all efficient Public Health Departments should have X-ray equipment at their disposal, either at the dispensary or at the hospital. He said that his present knowledge did not enable him to distinguish by the X-ray method a hydrogen swell from a tin blown by decomposition. In reply to another question he stated that the fact that a film is actually that of a tin in question can frequently be confirmed by (1) shape and soldering of the joints, (2) stamp on the lids, (3) special structure and assembly known to the trade.

CROWDS THRONG CHARING CROSS CANNING SHOW—CANTOR LECTURES ON FOOD—LOCKERS STILL EXTENDING—"FOOD MANUFACTURE" MOVES—FOOD MANUFACTURING EQUIPMENT—"ALUMINIUM FACTS AND FIGURES"—MECHANICAL HORSE NOW!—CHEMICAL PLANT—ANOTHER NEW SLICING MACHINE

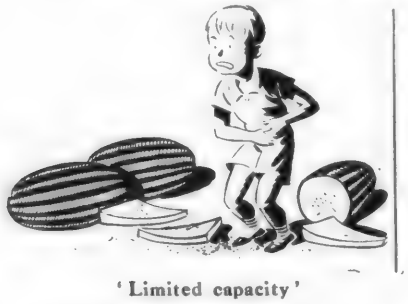
Crowds Throng Charing Cross Canning Show

Over thirty British canners co-operated in the exhibition of British foods at Charing Cross, which opened on March 4 and continued until March 23. In recesses round the interior of the artistically arranged stand were to be seen samples from the productions of practically every British cannery.

Many of the packs on display were new even to the members of the canning industry themselves, for it would probably be no exaggeration to say that every canned food now in production in Great Britain, from Morton's "Cod Roe" to Chappel Bros.' "Ken-L-Ration" canned dog food, was to be seen at Charing Cross. The general appearance of the Metal Box Co.'s display was exceptionally attractive. Carried out chiefly in Cambridge blue and white, with concealed lighting, the rear of the stand was occupied by open displays of canned goods, the packs being grouped under the generic headings of meats, soups, vegetables, fruits, milk and cream, and fish.

Free Samples

In the centre of the stand was an attractive photograph of a Kent fruit farm, and on the stand in front of it was a display of fruit pies and flans



'Limited capacity'

prepared from British canned fruit in the kitchens of the Army and Navy Stores, as well as a number of glass-topped display packs. At unobtrusive counters in front of the displays, uniformed attendants dispensed samples of hot soups, vegetables, fruit and cream, etc., to the visitor, and handed him or her an attractive combined recipe and information book, besides answering any questions the visitor asked. Many regretted that their limited capacity prevented them from sampling all the good things available.

Before leaving, the visitor received a neat printed slip about the size of a visiting card with the information that British canned cherries (*e.g.*) had been tasted and that presentation of the card to a grocer would enable anyone to buy an identical pack.

Free Competition

The visitor was also invited to enter a free cash prize competition for the selection of the three "best-dressed" packs. In the forefront of the display was a push-button operated double seamer, producing the famous "Keep your money in the Country! Buy British Canned Goods" money-boxes, which were a feature at Leicester.

Cantor Lectures on Food

Two Cantor Lectures on "Diet and Climate" were delivered before the Royal Society of Arts on January 28 and February 4 by Hariette Chick, C.B.E., D.Sc., of the Lister Institute of Preventive Medicine.

In the first ("Discovery of the anti-rachitic vitamin D. Influence of sunshine") an account was given of the recent discovery that sunshine plays a part in animal nutrition in controlling the metabolism of calcium salts and phosphates.

The second lecture ("Diet in relation to various climates") comprised a survey of the ordinary foodstuffs, classified according to the method of McCollum as (a) *non-protective foods* rich in calories and providing energy (bread, sugar, cereals, vegetable fats) and (b) *protective foods* (animal fats, liver, cod liver oil, dairy products, green vegetables, and fruit), which are valuable as containing protein of "good" quality and essential minerals and vitamins.

Mr. Walter Braby

We regret to announce the death of Mr. Walter Braby, Chairman of Fredk. Braby and Co., Ltd. He passed away peacefully on February 28, after a sudden illness of only one week.

He entered the firm, at the request of the founder, his cousin Mr. Fredk. Braby, in the year 1872. His business career was spent daily at the headquarters in Euston Road, with a break of two years in the early part at the Deptford Works. He was elected a member of the Board as early as 1881, appointed Secretary in 1883 and became Chairman in 1917.

Mr. Walter Braby was an able administrator of strict integrity, the highest principles, and sound judgment. His kind and even temperament and consideration for others endeared him to all who knew him.

There are four sons, one of whom, Cecil P. Braby, is in the Company in the capacity of Assistant Secretary.

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We have received from Messrs. British Cellophane, Ltd., a copy of an illustrated folder entitled "'Cellophane' puts each bottle in a showcase of its own". The object of this is to help cocktail, cordial, wine, and spirit manufacturers to obtain the best possible results from the use of "Cellophane" transparent wrappings.

Valves

Messrs. Newman, Hender and Co., Ltd., of Woodchester, Glos., send us an illustrated catalogue describing the Newman-Milliken patent lubricated plug valve, for which they have secured the sole world rights, excluding the U.S.A. They are thoroughly familiar with the packing of their valves with lubricants which have been specially prepared for use with foods, such as milk, and are able to state that the taste or colour of such food will not be affected in any degree by their use. They claim, in fact, that these valves are ideal for use in factories manufacturing food products.

Lockers still Extending

There is no better evidence of trade improvement than the extensions which are taking place in many of the old-established firms; this applies particularly to Thomas Locker and Co., Ltd., Warrington, who, in addition to the wire working factory recently opened up, have now taken over an old-established engineering firm, specialising in plant for the soap, chemical, and allied industries.

Whilst this new engineering section will nominally remain a separate entity under the name of Lockers (Engineers), Ltd., it will have the advantage of the experience of the parent company, and while maintaining the production of mixers, dryers, agitators, coolers, etc., it is undertaking the manufacture of screens, conveyors, feeders, hoppers, chutes, tanks, and every description of rivetted and welded work.

The various shops are equipped with the most up-to-date machines, and the foundry, in addition to producing iron castings up to 20 tons, makes brass, bronze, aluminium, and special alloy castings, which can be supplied promptly, machined complete if desired.

Two features of the service which the firm offers are the special staff maintained to handle breakdown jobs at any time, and the portable electric welding plant able to travel anywhere at call to deal with urgent repairs.

Lockers (Engineers) will follow closely the policy of the parent company in offering without obligation technical advice in the solution of problems, and any firm faced with difficulties connected with mixing, drying, cooling, screening, conveying, and feeding, is invited to seek the assistance of Messrs. Lockers.

Tea Machinery Business Changes Hands

Since 1911 Bartlett tea machines and blenders have been made by Henry Pooley and Sons, Ltd. Owing to the growth of their weighing machine business, Pooley's have decided to devote themselves exclusively to it, and the Bartlett tea machinery and blending business has been transferred to Savage and Co. (Tea Machinery and General Engineers), Ltd., 28 Love Lane, Eastcheap, London, E.C. 3.

Savage's are themselves well known to our readers as manufacturers of tea machines and blenders; they will now manufacture Bartlett machines in addition to the Savage range of machines, and the repair and reconditioning of Bartlett machines will be carried out by them.

A section of the Charing Cross Canning Exhibition, showing in the foreground the double seamer which produced thousands of "canning moneyboxes" for distribution among the visitors.

Chain Speed Transformers

The Renold and Coventry Chain Co., Ltd., of Manchester, have a wide experience in power transmission problems, and now announce Renold Chain Speed Transformers as a development of their work. As well as incorporating all the advantages of chain drives, a self-contained high ratio speed transformer unit is provided. The transformers run quietly and the chains have a high degree of resilience, and N.P.L. tests have shown that they deliver over 98½ per cent. of the power available.

A useful series of selection charts in a booklet recently published by this firm gives a complete guide to their range of speed transformers.

"FOOD MANUFACTURE" MOVES

Owing to staff increases and various developments of our work the offices which we had occupied at Thanet House in the Strand for seven years no longer afforded sufficient accommodation.

We have accordingly moved to more commodious premises. All correspondence, enquiries, etc., should now be addressed to us at 17, Stratford Place, W. 1. (Telephone: Mayfair 7383.)

Food at Ideal Home Exhibition

The nineteenth *Daily Mail* Ideal Home Exhibition opened at Olympia on March 26 and will run until April 18. Much of interest from the point of view of food is to be seen there.

A £50,000 installation of the very latest types of British made canning machinery, including plant for peeling, coring, de-seeding, slicing, etc., as well as canning plant proper, is demonstrating the rapid strides made in this industry; apples, cranberries, and other fruits are being canned.

At the "University of Cookery" any visitor who wishes may attend, free of charge, an intensive course in expert cookery, where every feature of successful cooking by gas, electricity, oil and stove, and the preparation of many attractive dishes from cold and canned foods, are being demonstrated and explained in detail by leading culinary specialists. Three demonstration lectures each lasting one hour are being given daily.

Much attention is being attracted to the series of Ideal Kitchens for All, and in the "Health for All" Street the simple truths about diet are being explained and information is being given about foods specially suitable for the modern accelerated mode of living.

"Keepability" of Butter and Margarine

An interesting test has recently been carried out by the research chemists of Van den Burghs and Jurgens (Sales), Ltd.

Equal quantities of Danish butter, Australian butter, and Stork margarine were purchased at the beginning of January from an ordinary grocer's shop. The packets—fifteen in all—were stored under ordinary household conditions (without refrigeration) and examined at the end of seven weeks. Of the ten packets of butter it was found that eight had turned rancid or mouldy or had a very strong smell, whilst the remaining two could be used only for cooking.

All the packets of margarine, however, could still be used for all ordi-

nary domestic purposes and were as edible as on the day when they were purchased.

Food Manufacturing Equipment

This is the title of what is described as a guide to the uses of Monel metal, nickel, and inconel in the food industries, and is issued by Henry Wiggin and Co., Ltd.

In their introductory paragraphs the authors wisely remark that whilst the metals are employed for numerous purposes their use depends upon a particular corrosion problem, and, they add, it is not always possible to assert that one material is the best to meet all conditions. This is probably more applicable in the food industries, in which conditions vary so much, than in any other industry.

The descriptive matter which is given under the names of chemical substances, foodstuffs, and equipment in alphabetical order is not exhaustive, but will be very valuable to food manufacturers contemplating the design or installation of new plant. Equipment embodying Monel metal and nickel parts is illustrated throughout the pages. Inconel is a nickel-chromium alloy of comparatively recent introduction with which much practical experience has not yet been gained. However, very promising results are claimed.

Though reference is made under one heading to the absence of any necessity to oil or grease surfaces of plant to preserve the condition when not in use, no information is given so far under any special heading dealing with cleaning and care of plant, which is very important, for failure to clean and dry parts of plant immediately after use in the proper manner is often the cause of commencement of corrosive action.

The first part of the Guide now issued starts at A for Accessories and ends at D for Dish-pans, and includes reference to such items as agar-agar and apples, bacon and beer, beheading machines (for fish), cane juice and catsup, to name a few.

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Messrs. Elliott Brothers (London), Ltd., of Century Works, Lewisham, London, S.E. 13, send us a catalogue (No. 890) describing their Siemens Ring Balance Meters.

These may be employed for the measurement of pressure and draught, either simple or differential, and as flow-meters for gas, air, water, or steam in foundries, iron and steel works, boiler-houses, heating and ventilating plants, etc.

Advantages claimed for these meters are: great accuracy for low pressure measurements; very small loss of head when used as flow-meters; no moving parts in pipe-line; robust construction; distant transmission of readings, if desired, and the range can be easily altered.

Geared Motors

Messrs. Crofts (Engineers), Ltd., of Thornbury, Bradford, were pioneers in the design and application of industrial geared motors, and their new catalogue ("Enispeed" "Efficiency" Geared Motors and Reduction Gears) gives a very good indication of progress made in recent years.

Merely to glance through this new list is to be amazed at the very wide range of standard units which are included, and the method of selection is simplicity itself, it being only necessary to know the output or machine speed required and the horse-power.

Full details are given of each type of unit, the powers of which range up to 120 h.p. Any required ratio can be given with any one of the various geared motors listed.

"Aluminium Facts and Figures"

Literally a mine of information is the volume with the above title recently published by The British Aluminium Co., Ltd., of Adelaide House, King William Street, London, E.C.4.

This has been enlarged to 9″×7″ from the previous pocket size edition, containing a considerable quantity of additional matter, and has been brought up to date.

It is divided into two sections, the first (100 pp.) being devoted to "Forms and Sizes", and the second (58 pp.) to "Working and Finishing". A good idea of the comprehensiveness of the work can be gained from the sub-sections; indeed, it is difficult to think of anything else which might have been included.

Information is given about all the alloys as well as the parent metal, including, for example, "Duralumin", "Birmabright", and the "RR" series; but whilst their properties are explained, their applications are not discussed. The Company issues a series of booklets describing and illustrating the uses of the metal and its alloys in many different fields.

Under "Forms and Sizes" is to be found information on properties, wire and sheet gauges, factors and formulæ, physical properties, *ingots* and billets, rods, bar and strip, foil, *wire*, stranded conductors, B.S. specifications, *alloys*, *sheets*, strip and *circles*, matting, expanded sheet, rivets, wood screws, *tubes* and pipes, *sections*, and collector bonds. Thumb indexes are provided at the points indicated by italic type, greatly increasing the ease of reference which is a characteristic of the work.

The following are dealt with under "*Working* and *Finishing*": heat treatment, mixing, melting and casting, panel forming, press work, spinning, machining, forging, welding and soldering, riveting, polishing, cleaning, matt finishing, anodising, painting.

A 3-page index gives instant reference to each of the many subjects dealt with and not obviously covered by the thumb index, so that the whole work is very easy to use.

Mechanical Horse Now!

Food manufacturers are alive to the fact that motor lorries are a paying proposition on fast long-distance work, but their use on short-distance haulage, in big towns, is often not economical. The horse-drawn vehicle gives even less satisfaction; its mobility is outweighed by great disadvantages. It is slow, time wasting, and the cause of traffic delays.

This lack of economical short-distance transport methods has led to the rapid development of the amazing Scammell Mechanical Horse. This machine not only combines the mobility and economy of the horse with the greater speed and greater load capacity of mechanical transport, but has a greater profit-earning ability than that of ordinary vehicles used on short distance hauls.

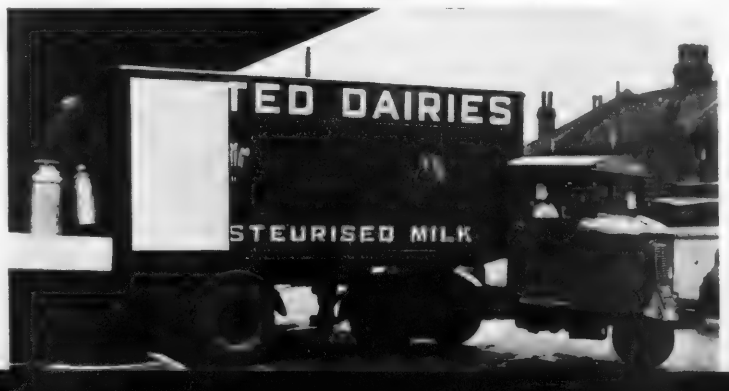
The "horse" is a separate motive unit which can be used with interchangeable carriers. One "horse" can operate a fleet of carriers of a varied nature, if necessary, to carry different types of loads. Initial outlay, running and maintenance costs are low. One tax covers the motive unit and any number of trailers.

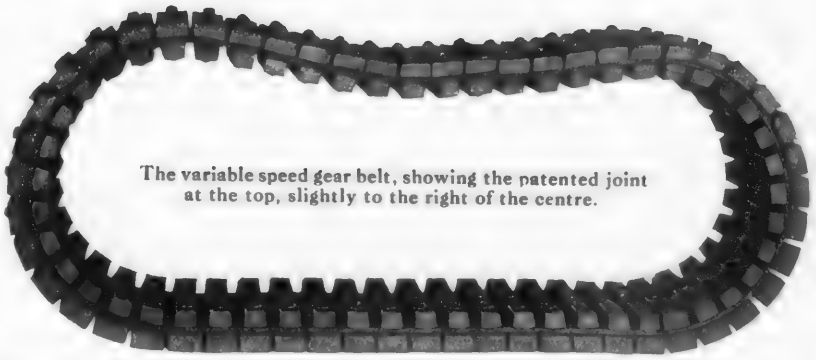
Coupling and uncoupling of "horse" and trailer is automatic. It can be accomplished from any angle, and is controlled from the driving seat by a patented device.

Its ability to turn in a circle of fifteen feet, without reversing, saves time in narrow streets, and permits dense traffic to be negotiated easily and quickly.

The Scammell Mechanical Horse has been adopted by railway companies, haulage contractors, municipal authorities, and large and small business houses where efficient and cheap short-distance transport is required.

The "Mechanical Horse" does *not* eat while it's waiting!





The variable speed gear belt, showing the patented joint at the top, slightly to the right of the centre.

New Belts

We have received from Messrs. Crofts (Engineers), Ltd., Thornbury, Bradford, a leaflet describing their new variable speed gear belts with central pull.

It will readily be appreciated that the belt of a variable speed gear is of vital importance to the machine as a whole, and Messrs. Crofts put forward their patented design with full confidence that it gives maximum gripping surface when driving, with great flexibility and with a joint of equal strength to the belt itself.

Chemical Plant

Messrs. Enfield Rolling Mills, Ltd., of Lincoln House, High Holborn, London, W.C. 1, send us a very attractively got up brochure describing the extensive range of products manufactured at their Brimsdown works.

Apart from special plant designed and constructed for use in the dairy and brewing industries, every kind of equipment used in the food industries is represented in the comprehensive range of E.R.M. products.

Pure nickel, aluminium, monel, inconel, and "Staybright" steel are the metals mostly used for E.R.M. plant used in the various branches of food manufacture. Due precaution is taken to ensure that the food shall not become tainted or flavoured by any metal with which it comes in contact, and special attention is given to the problem of corrosion by brines, fruit acids, sterilising solutions, etc.

Simplicity and efficiency are the guiding principles of design; every seam, crevice or angle which might be a trap for waste matter or bacterial colonies is eliminated wherever possible. E.R.M. experts are always available to advise as to which is the most suitable E.R.M. equipment for any specific requirements.

The brochure is very effectively illustrated with good photographs.

Valuable sections are devoted to the physical properties of pure nickel, monel metal, and "Staybright" stainless steels, and in the 16 pages devoted to "Established Uses of Monel Metal and Nickel", together with the 6 pages of tables showing the effect of various reagents on "Staybright" steel, has been brought together a wealth of information which will assuredly be found most useful for reference purposes.

The brochure concludes with a list of 250 Enfield metal products, and some more photos showing interior views of the Brimsdown works.

Another New Slicing Machine

In September last we drew attention to the then new fully automatic dicing and slicing machine brought out by The Lazenby and Ridgwell Canning Machinery Co., Ltd.

Numerous vegetable canners and soup manufacturers showed keen interest in the machine, but considered the output (4 tons per hour) too large for their requirements.

This enterprising firm has accordingly designed a smaller machine, with an output of 1-1½ tons per hour, and this is now available.

Other items from the specification are: pulley wheel dimensions 16×3 in., r.p.m. 180-200, power consumption approx. 3 h.p., net weight approx. 5 cwt. (gross approx. 6 cwt.), case dimensions approx. $5 \times 2\frac{3}{4} \times 2\frac{3}{4}$ ft.

This Junior Model, which is fully automatic too, has been tested on carrots, potatoes, and apples, and has given remarkable results. The dicer is converted into a slicer by the removal of one set of knives.

NEW COMPANIES

ALBION BAKERIES, LIMITED. To carry on the bus. of bakers, etc. Nom. Cap.: £1,000. Dir.: F. R. Mountstephen, 25, Bridge Road, East Molesey, Surrey.

BRISTOL SPA MINERAL WATERS, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in mineral and aerated waters, etc. Nom. Cap.: £1,000. Subs.: T. W. A. Ackrill, 16, Whiteladies Road, Bristol; A. F. Clark, 42, Lake Road, Henleaze, Bristol.

CHAMPION CONFECTIONERY COMPANY, LIMITED. To carry on the bus. of mnfg. confectioners, etc. Nom. Cap.: £1,500. Permt. dirs.: A. S. Tittle, 70, Kennington Avenue, Bishopston, Bristol; R. W. Ford, 32, Lodore Road, Fishponds, Bristol; F. E. Stone, 7, Luccombe Hill, Redland, Bristol.

CURNOWS CAFÉS, LIMITED. To take over the bus. of a baker and confectioner cd. on by C. W. Curnow at St. Ives and Carbis Bay, Cornwall. Nom. Cap.: £10,000.

D. M. KELLETT, LIMITED. 6, The Broadway, Worthing, Sussex. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £1,500.

DOUGLAS ARGYLE, LIMITED. 55, Cross Street, Manchester. To carry on the bus. of chocolate mnfrs. and confectioners, etc. Nom. Cap.: £100.

H. PAYNE (NOTTINGHAM), LIMITED. To carry on the bus. of confectionery mnfrs., etc. Nom. Cap.: £3,000. Subs.: H. Payne, 106, Pyne Road, Nottingham; W. H. Payne, Frederick Avenue, Carlton, Nottingham.

M. BERMAN AND SONS, LIMITED. To take over the bus. of bakers and confectioners cd. on by M. Berman and Sons at West Bar Green, Sheffield. Nom. Cap.: £1,000.

MICK GOLD, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in confectioneries, etc. Nom. Cap.: £1,000. Permt. dirs.: M. Gold, 8, Chapel Street, Islington, N. 1; Mrs. F. Gold, 8, Chapel Street, Islington, N. 1.

PANNAN COMPANY (1935), LIMITED. 272 to 276, Southmead Road, Bristol. To carry on the bus. of mnfrs. of and dlrs. in biscuits, confectionery, etc. Nom. Cap.: £1,500.

ROWLEYS (TABAC), LIMITED. 46, Goldhawk Road, Shepherds Bush, W. 12. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £200.

STEELS (GRIMSBY), LIMITED. 84, Park Street, Grimsby. To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap.: £500.

TRANSFLEX, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in animal feeding stuffs and prepared foods, breeding and rearing apparatus and appliances, flexible transparencies, transfers, etc. Nom. Cap.: £80,000. Permt. dirs.: B. C. Kerr, 23, Thickett Road, Anerley, S.E.; A. B. E. Cheesman, 32, Museum Chambers, W.C. 1.

WILDERS' MUSHROOM FARM, LIMITED. To carry on the bus. of mnfrs. of spawn for the cultivation of mushrooms, cultivators of mushrooms, etc. Nom. Cap.: £1,000. Permt. dirs.: Mrs. M. L. Wilder, Glenroy, Raymead Road, Maidenhead; A. Wilder, Riversdale, Raymead Road, Maidenhead; C. Wilder, Glenroy, Raymead Road, Maidenhead.

WORTH AND COMPANY (SHEFFIELD), LIMITED. To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap.: £1,500. Dirs.: J. W. Hollingworth, 154, Langsett Avenue, Sheffield; H. Chapman, 41, Westbrook Bank, Sheffield.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C.

INFORMATION and ADVICE

Cocktail Sausages—Artificial Casings—Biscuit Making—Baking Powder—Ginger Essence—Effervescent Tablets—Salt—Custard Powders—Discoloured Fish Paste—Anchovy Paste—Ox Feet—Gravy Thickening—Pickled Beetroot—Chutney—Sweet Pickle—Salad Cream

Cocktail Sausages

1,807. *Do you happen to be able to furnish us with a recipe for the preparation of cocktail sausages?* (England.)

The following may be of some assistance:

Lean pork	5 lb.
Fat pork	2 ,,
Wet rusks	4½ ,,
Dry rusks	½ ,,
Salt	3 oz.
Pepper	½ lb.
Cayenne	⅛ ,,
Mace	¼ ,,
French spice	¼ ,,
Ginger	¼ ,,

Place the rusks and skin in soak. Prepare meat. Pass lean pork through mincer, then to bowl chopper. Add seasoning, wet rusks, followed by fat pork, and, finally, dry rusks. Chop very finely. Fill into narrow medium casings (sheep's) and link off in 3 in. lengths (boiled in Bismarck brown) for a few minutes. Packed in liquor, they should be filled firmly and tightly.

1,808. *Please forward particulars for first-class transparent jelly suitable for filling into wax paper cases along with chicken. Could you supply also particulars of best method for preparing chicken?* (Inverness.)

Information supplied.

Artificial Casings

1,809. *We are endeavouring to find out whether it was known before June, 1931, to print the maker's name, etc., on artificial casings for sausages. Could you easily tell us whether the Mellon Institute of Industrial Research have proposed to print on these casings? Alternatively, have you a paper by this Institute likely to give the information which we seek?* (London.)

My information on this subject is only of a very general nature, and I think that your best plan would be to write direct to the Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa., U.S.A.

The work on synthetic casings was the first of the Erwin O. Freund Fellowships established at the Mellon Institute, and its purpose was to develop a synthetic casing which could be used in the manufacture of sausages. The incumbent of this first fellowship was C. L. Weirich, who investigated the field of materials and processes. The work was continued until 1920.

You will find a paper on this subject in *Industrial and Engineering Chemistry*, November, 1926, page 1190, entitled "Cellulose Sausage Casings," by Henderson and Dietrich. No doubt you will be able to turn up this paper in the Patents Library.

I understand that these casings are manufactured by the Visking Corporation of Chicago. Apparently, their product, the "Visking Casing," is protected by patents.

1,810. *We have an enquiry for "chocolate" filling and covering.*

We do not know if this means one of the concentrated essences or a bulk filling, but perhaps you can assist us with some information as to the basic constituents of both. (London.)

Presumably you mean by this a cocoa cream mixture. This is rather a difficult thing to make up unless you have had experience, and we would suggest that you get in touch with ——, who could help you on the subject.

As regards covering, I take it you mean by this either ordinary coverture, or if you want a cheaper product, a chocolate compound. We discussed the latter in our November issue, but if you wish to go further into the matter, we would again advise you to raise the point with ——.

1,811. *I shall be grateful if you will kindly supply me with a formula for a good, soft caramel with a good "chew" and yet not sticky, suitable for making by hand methods in small quantities.*

In making buttered goods (buttered almonds, etc.), I find difficulty in mixing the butter with the sugar boiling when added at the end of the boiling. Could you please give me any advice on this? (N.E. Rhodesia.)

Two formulæ and other information were supplied.

Biscuit Making

1,812. *As subscribers to your magazine* FOOD MANUFACTURE, *we should be obliged if you will let us know what kind of fat is used in biscuit making.* (Cheshire.)

So much depends on the type of biscuit; generally speaking, butter, margarine, coconut oil, cocoa butter, palm oil, lard and compound fats are used.

1813. *Will you kindly let us know if whale oil is used in biscuit making?* (Cheshire.)

There is no doubt that whale oil is used for the preparation of compound fats, but the oil would have to go through a thorough refining in order to remove all taste, and it is probable also that it would have to be hydrogenated.

We have never heard of whale oil being used as such, but, of course, everything depends on the state of purity of the oil. If it is a perfectly colourless, odourless, refined oil, we do not see any reason why it should not be used in connection with biscuit making. It might have to be hardened up either by hydrogenation or by incorporation with harder fats.

Baking Powder

1,814. *May we ask if you can favour us with a good recipe for baking powder?* (England.)

There are so many types of baking powder that without knowing more about your particular requirements it is impossible to give you any definite answer to your question.

By far your best plan is to put your proposition to a food technologist, who will be able to let you have a formula which will meet your particular requirements.

I am enclosing some notes on baking powder, including some formulæ from which you will see the type of ingredients which are used.

1,815. *We have received a letter from a South African customer asking for supplies of Red Paraffin Wax for waxing Gouda Cheese.*

Would you be good enough to advise us whether you have any information on this subject and let us know where the wax used in Holland could be obtained? (London.)

Information supplied.

1,816. *I am interested in a newly patented process for the solidification of milk, and would be very much obliged to you if you could connect me with firms engaged in this new process so that I might get some particulars about it.* (Lodz, Poland.)

Suggestions were made.

1,817. *I have been advised to ask you if you can kindly give information on the irradiation of foodstuffs such as milk, eggs, honey, etc. I have an apparatus for producing ultra-violet rays.* (Northumberland.)

We would suggest that you read the reply we gave to a similar enquiry which is published in the September, 1934, issue of our associated journal, *The Manufacturing Chemist* (page 314).

Ginger Essence

1,818. *We are desirous of making ginger extract or essence from the raw materials, to be blended with other necessary ingredients and packed in a concentrated form for dilution in the home. We should be glad of any information which you can give on the subject.* (Hove.)

Colourless Ginger Essence.

From volatile oils (2 oz. per gallon)—

Oil of cloves	¼ oz.
Oil of cinnamon	½ ,,
Oil of ginger	12 ,,

Distil and then add—

Ethyl acetate	2 oz.
Alcohol	6 ,,

Final result 10 lb.

Stomachic Ginger Essence.

Cinnamon bark	1½ oz.
Cardamom	1½ ,,
Coriander	3 ,,
Carob	12 ,,
Ginger root	9 lb.

Macerate with—

Wine distillate	3 lb.
Alcohol	12 ,,
Water	12 ,,

First percolate 9 lb. The after percolate is 5 lb. and is rectified to 1 lb., which is added to the first percolate to yield a final result of 10 lb.

Ginger Essence from Root.

2 oz. per gallon.

10 lb. crushed ginger root are macerated with 10 lb. water, in which 2 lb. sodium bicarbonate are dissolved. Let stand for a day and then reject the worthless extractive liquid and wash the root with cold water several times until the water running off is colourless and tasteless. The root, after draining, is then treated with—

Alcohol	5 lb.
Water	6 ,,
Wine distillate	1 ,,

for three days, and then percolated to yield 9 lb. first percolate. The after percolate, obtained by aid of more water, is distilled off to yield 1 lb., which is then added to the first percolate to yield 10 lb. essence.

1,819. *I would be pleased to know the regulations at present in force in Great Britain concerning the quantities of lead and of tin that are tolerated in foodstuff preserved in tin cans, and particularly sardines; please let me know at the same time if said percentages are calculated in relation to solid contents or to liquid contents, or to both together. If said regulations are published, please let me know where they are obtainable and to whom I should apply to have a copy.* (Nantes, France.)

Some general information was supplied. There is no definite law in this country regarding the amount of these metals permissible in such foods.

1,820. *Please supply:* (1) *Formula for a vanilla custard powder;* (2) *Formula for an effervescent health salt. With regard to this latter article, can you give me a brief description of the principle on which this type of health salt acts? Also, would it affect the action if the salt were sweetened and flavoured?* (Reading.)

Full information was supplied on both points.

Effervescent Tablets

1,821. *Would you give me a formula for making an effervescent tablet? I am using a Cotton rotary machine and find, when trying to make the tablets, that they stick, the fault being the acid getting sticky with the friction of the punch.* (Australia.)

This is a trouble which many people have experienced. To some extent, at any rate, the difficulty may be overcome by using tartaric acid and a special form of die, particulars of which may be obtained from the manufacturer.

Salt

1,822. *Thanks for your advice on gum tragacanth. My experiments with this have been quite satisfactory. Could you advise me what to mix with salt to make it suitable for packing as table salt? Will a fine dairy salt do for this purpose?* (Lancashire.)

We are not clear just what you have in mind. It is hopeless trying yourself to improve the quality of a low-grade salt by adding something to it or even by re-crystallisation. The latter would not be an economic proposition; your best plan is to start off by purchasing in bulk the particular grade you wish to market. On the other hand, if your idea is to make this free running, you can do this by the addition of quite a small percentage of tri-calcium phosphate, and particulars of amounts and method of incorporating may be obtained from the suppliers of the phosphate; it is best to submit to them a sample of the salt you propose to treat.

1,823. *We should like to have a copy of the reply to Question 1,752 in the December, 1934, issue of* FOOD MANUFACTURE *(information on custard powder).* (New Orleans.)

This was sent.

Custard Powders

1,824. *Would you kindly furnish us with particulars of the preparation of custard powders? We understand that high-class custard powders can be prepared without the use of cornflour. Have you any information on this?* (England.)

We gave some information of a general nature such as we have previously published on several occasions.

It is difficult to see how one could possibly prepare a custard powder without the use of a cereal starch. However, perhaps some of our readers will enlighten us on this point.

Discoloured Fish Paste

1,825. *We to-day sent you two bottles of our salmon and shrimp paste. You will notice that these are discoloured, this taking place during the sterilisation.*

We have now been making fish pastes for a considerable time, and we have never had any trouble. Only the last two batches have become discoloured during the sterilisation process.

We have always made it in exactly the same manner in every way, and therefore cannot understand why this should occur.

The first batch to become discoloured was last week when we made salmon and anchovy paste. We thought, then, however, as we started a new tin of anchovies, that they may have been the cause of the trouble. A couple of days ago we made salmon and shrimp and the same has happened, the two bottles showing you the trouble.

We write to ask whether you are in any way able to help us to get to the root of the trouble. In the meantime, we are not making any more of this, being afraid that it will occur again. (Europe.)

We have not opened the glasses, but the large, almost black patches are plainly to be observed. They have a purple tinge, which is interesting in view of investigations carried out by Kokichi Oshima of Hokkaido Imperial University, Japan, on the cause of "blue meat" which sometimes occurs in canned crab. This probably arises from the copper content of crab's blood, and it is thus advisable to wash the blood out of the crab before canning. There are other ways of treating the meat. Blackening has, of course, quite a different origin and is easily avoided by double lacquering the can or enclosing the meat in vegetable parchment.

With regard to the fish paste problem put up by our enquirer, we advised him to have a proper chemical and bacteriological examination made. It should then not be a difficult matter to diagnose the case.

1,826. *We shall be much obliged if you can let us have recipes for making shrimp, anchovy, etc., pastes.* (Midlands.)

A recipe by way of illustration was quoted and the enquirer referred to a general article which we have previously published on this subject.

1,827. *In making a paste we use —— (the enquirer quotes his recipe). Would it be in order to incorporate 5 per cent. of filler?* (England.)

This is a rather awkward question, as there are no definite regulations concerning the permitted amount of cereal filler. One would imagine that if it does not exceed 20 per cent. no objection would be raised. Five per cent. seems to be a very reasonable amount. The actual amount is really determined by the nature and amounts of the other ingredients and the consistency and texture desired in the finished product.

1,828. *Please send information on sardine preparation.* (Warsaw.)

We would refer you to the article which appeared in our November, 1934, issue dealing with sardine canning in California.

Anchovy Paste

1,829. *Kindly send us some information regarding the manufacture of anchovy paste.* (Norway.)

The anchovies (say 112 lb.) are split and boned and mixed well with butter, salt, white pepper, curry powder, and ground nutmeg, together with sufficient colouring matter. Pass through a mincing machine and fine sieve.

An example of such a recipe was furnished.

Ox Feet

1,830. *After boiling ox feet in a steam-jacketed pan there is a black glutinous deposit which covers the surface entirely. How can this deposit be avoided, and if it cannot be avoided, what is the simplest method of removal?* (Scotland.)

We have not heard of any such deposit being formed on this particular type of metal pan (the enquirer named the metal), and would suggest that you submit a sample of the deposit to an analyst. It should not be difficult to propose a remedy once the nature of the deposit is known.

Gravy Thickening

1,831. *Please supply recipes for gravy thickening and browning, such as Bisto.* (Scotland.)

I am afraid that we can only undertake to give general information, as if you have a particular sample to be matched this is best done by placing the matter in the hands of a consulting food chemist.

Gravy brownings and thickeners usually consist of a starch, salt, and caramel powder. It is important to have the starch (which might be sago starch) in a finely powdered condition free from lumps, and it is also necessary to secure a uniform mixing with the caramel powder. This is not so easy as it looks.

1,832. *I should be pleased if you would let me know of a recipe for shrimp sauce.* (Boston.)

Some information was supplied.

Pickled Beetroot

1,833. *We have read with interest your reply to query* re *"Beetroot" in your previous issue, which we think most satisfactory.*

We should be glad if you could inform us if there is any preservative or means which could be adopted to prevent fermentation of beetroot after it has been bottled in malt vinegar.

We are aware that in consequence of the presence of sugar in the beet it is liable to ferment somewhat readily, although we are of opinion there has been produced recently a preservative which will obviate this trouble. You do of course suggest the use of benzoate of soda, although in this case one scarcely thinks it is permissible. However, perhaps you may have the latest information on the matter. (Yorkshire.)

The best way to guard against fermentation of beetroots is to pickle them. The pickle must contain 4½ per cent. of acetic acid and about 1¼ per cent. of salt after the sliced beetroots have become saturated. Particulars were given to the enquirer as to how the process is carried out without using benzoate of soda.

1,834. *We should esteem it a favour if you could send us particulars regarding the pickling of green gherkins. We are only in difficulty so far as colour is concerned, and are at a loss to obtain the dark green colour which is necessary.*

We have been successful in putting gherkins into brine and, after taking them out, making a sweet pickle, the flavour of which is very satisfactory, but when the product is finished it is a muddy brown colour instead of a bright green. (London.)

Some notes on the subject were sent to our correspondents.

Chutney

1,835. *Some considerable time ago I sent you the enclosed recipe for tomato chutney, asking your assistance in preventing fermentation after bottling. Since starting to bottle hot the trouble has disappeared.*

I should now like to ask (1) *how to use gum tragacanth, and* (2) *should acetic acid be made down to table vinegar strength and the same quantity then used and in the same way as malt vinegar?*

Kindly also let me have recipes for beetroot and other chutneys. (Scotland.)

When using gum tragacanth, soak it overnight in vinegar—say, about 1 lb. gum to 1 gal. vinegar.

As regards your second question, the extent of dilution of the acetic acid (of, say, 80 per cent. strength) depends on the strength of the vinegar you wish to match. Thus, 16 grain vinegar contains about 4 per cent. acetic acid; 20 grain, 5 per cent.; 24 grain, 6 per cent. (roughly).

A beetroot chutney may be made by boiling, say, 50 lb. beetroots and then plunging them into cold water and immediately skinning them. Soak 1 lb. dark gum tragacanth in 1 gal. vinegar overnight and next day stir well and add another gallon of vinegar and place in steam-pan. Dissolve the sugar (say, 10 lb.) and salt. Chop the beetroots, onions, lemons, and chillies, and add to the pan. Ground ginger and ground white pepper should also be used.

An example of such a recipe was furnished.

1,836. *We should be pleased to receive a copy of the reply sent to Enquiry* 1,728, *in the December,* 1934, *issue of your journal* (*a method was required for brining Dutch onions*). (Wigan.)

This was sent.

Sweet Pickle

1,837. *We shall be pleased to know if you can supply us with a suitable commercial formula for Sweet Pickle.* (England.)

A formula was suggested incorporating, for the vegetables, a chopped mixture of sugar beets, cauliflowers, gherkins (all brined), sour apples, onions, glacé cherries, preserved ginger, and a little garlic.

The liquor is prepared from 24 grain malt vinegar, sugar, sultanas, lime juice, sago flour, salt, turmeric, caramel, and various spices.

Bring the latter to the boil. Add the chopped vegetables and boil for 5 minutes. Cool and stir occasionally. Fill into containers and cap.

Salad Cream

1,838. *Kindly be good enough to furnish us with a recipe for salad cream. This we believe is the sort made with whole eggs and which have to be boiled.* (London.)

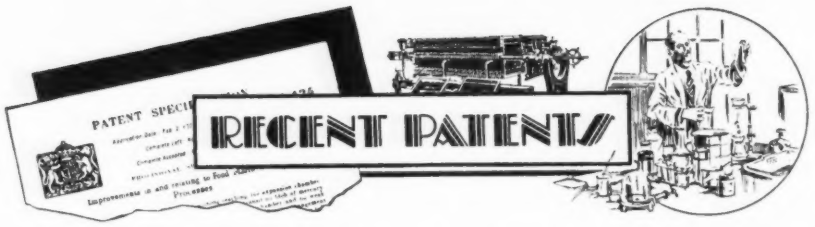
An example of such a recipe was submitted as a basis for further work on the enquirers' part.

1,839. *Friends of ours have asked us if we could let them have a recipe for the manufacture of salad cream for* commercial purposes.

We should appreciate it very much if you could give us any particulars as to what you suggest is the best basis. (London.)

Information supplied.

(A great many enquiries are held over to the next issue owing to lack of space.)



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Latest Patent Applications

3513. CARR, J. H.: Applying ultra-violet rays, etc., to food, etc. February 4.
3584. INTERNATIONAL PATENTS DEVELOPMENT CO.: Manufacture of dextrose. February 4. (United States, February 2, 1934.)
3984. NAPIER, J. W.: Coffee percolators, etc. February 7.
3999. BRUCE, M. F. G.: Apparatus for holding foodstuffs for grilling, etc. February 7.
4229. NEILL, J. H.: Rotary cutter for mincing machines. February 9.
4233. BERKEL AND PARNALL'S SLICING MACHINE MANUFACTURING CO., LTD. (MAATSCHAPPIJ VAN BERKEL'S PATENT NAAMLOOZE VENNOOTSCHAP): Slicing machines. February 9.
4234. FITZPATRICK, H. J. (BERKEL): Mincing machines. February 9.
4342. HUTCHINSON, W. V.: Covers for foodstuffs, etc. February 11.
4449. POMIERANIEC, J.: Fruit juice extractors. February 12.
4685. BREWSTER, J. A., and SMITHFIELD AND ARGENTINE MEAT CO., LTD.: Conditioning chilled meat, etc., in storage, etc. February 13.
4852. HALL, J.: Removal of foodstuffs from basins, etc. February 15.
4873. ALUMIUMWERK TSCHEULIN GES. and CRAEMER, C.: Packing material for perishable goods. February 15.
5246. DARRINGTON, T. A.: Salting intestines of animals for sausage skins. February 18.
5288. BERKEL AND PARNALL'S SLICING MACHINE MANUFACTURING CO., LTD. (MAATSCHAPPIJ VAN BERKEL'S PATENT NAAMLOOZE VENNOOTSCHAP): Slicing machines. February 19.
5378. JAHN, A. R.: Concentrating milk and milk mixtures, etc. February 19.
5379. BOVILL, E. V.: Cover for food, etc. February 19.
5410. BEATTIE, LTD., W., and MUIR, R. A.: Foodstuffs. February 20.
5550. SOUTHWELL AND CO., LTD., C., and STURGES, T. E.: Packing edibles, etc. February 21.
5600. POULTNEY, S. V.: Manufacture of extracts of coffee, etc. February 21.
5655. STANDARD BRANDS, INC.: Leavened bakery products. February 21. (United States, February 21, 1934.)
5656. DIJK, J. A. VAN, VLODRUP, C. VAN, and WATERMAN, H. I.: Treatment of vitamin-containing oils, etc. February 21.
5696. BERKEL AND PARNALL'S SLICING MACHINE MANUFACTURING CO., LTD. (MAATSCHAPPIJ VAN BERKEL'S PATENT NAAMLOOZE VENNOOTSCHAP): Slicing machines. February 22.
5708. MÖLLER, G.: Preserving eggs. February 22.
5709. MÖLLER, G., and PETERSON, P.: Preserving eggs. February 22.
5929. DAVIS, M. C.: Canisters for containing powdered, etc., food substances. February 25.
6030. BLAND, F. O. S.: Preservation of perishable articles. February 25.
6166. BALLA, N.: Production of aeration yeast. February 26. (Hungary, March 5, 1934.)
6204. LOVELL, A. J.: Containers for foodstuffs. February 27.
6277. THOMAS, H., BERKEL AND PARNALL'S SLICING MACHINE MANUFACTURING CO., LTD.: Slicing machines. February 27.
6713. SANCHEZ, P.: Treating sugar. March 4.
6830. MATHAEI, L., and ZEUZEM, J. O.: Apparatus for storing perishable goods. March 4.
6915. INDUSTRIAL PATENTS CORPORATION: Treatment of foodstuffs. March 5.
6919. INDUSTRIAL PATENTS CORPORATION: Treatment of foodstuffs. March 5.

Complete Specifications Accepted

423,331. NORDDEUTSCHE HEFEINDUSTRIE AKT.-GES.: Process for aerating fermentation liquids in the production of bakers' yeast. (Divided out of 26529/33.)
423,603. GODAL, A., and OVSTHUS, A.: Treatment of herring and other fish of the clupeidæ family for manufacture of oils and foodstuffs poor in fat and having good keeping properties.
423,621. FITZPATRICK, H. D. (MAATSCHAPPIJ VAN BERKEL'S PATENT NAAMLOOZE VENNOOTSCHAP): Slicing machines.
423,651. SCHOLTES, J.: Apparatus for cutting food, particularly meat. (December 2, 1933.) (Addition to 33925/33.) (Divided out of 33925/33.)
423,844. PALMER, H. J.: Manufacture of re-process cheese.
423,882. LAING, J.: Means of facilitating the cooking of canned food. (January 29, 1934.)
423,893. FITZPATRICK, H. D. (MAATSCHAPPIJ VAN BERKEL'S PATENT NAAMLOOZE VENNOOTSCHAP): Slicing machines.
423,971. SHORT MILLING CO., J. R.: Process for preparing organic oxidation products of fatty matter.
423,972. SHORT MILLING CO., J. R.: Process of producing baked products. (January 30, 1933.)
424,192. POLLAK, J. E. (Reed Candy Co.): Shaped edibles such as confectionery.
424,234. BAUR, J.: Method of production of a food compound for preparing sweetened drinks. (January 30, 1933.)
424,508. SUMMERS, R. G.: Treatment of substances for use as foodstuffs.
424,538. VINCENT, E.: Mincing machines. (April 4, 1933.)
424,857. REDDIE, L. N. (VOGT INSTANT FREEZERS, INC.): Packages for and method of packaging ice-cream or other frozen comestibles.

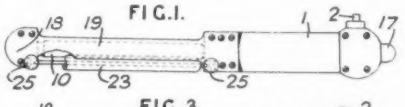
Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

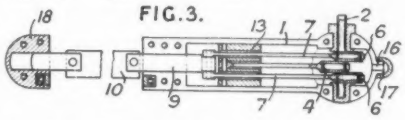
Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

420,126. Group VI. **Slicing appliances.** PAOLINI, M., 3, Scala Feroli, Trieste, and PERCO, F., Lucinico di Gorizia, both in Italy.

A power driven hand tool for slicing or carving comprises a handle 1 enclosing eccentric gear on a shaft 2 which is coupled—*e.g.*, by a flexible shaft—to a source of power, the eccentric gear being arranged to reciprocate a knife blade or blades 10 guided at one end in the handle and at the other end in a head 18, which is spaced from the handle 1 by a bridge piece 19. The slice thickness is determined by a roller 23 which bears on the surface of the meat and is adjustable, away from and towards the knife blade,





by set screws 25. As shown in Fig. 3, one knife blade is provided, and balancing is effected by a reciprocating weight 13 actuated, counter to the knife reciprocations, by an eccentric 4 placed between two eccentrics 6, which are coupled by rods 7 to the guide member 9, to which the knife is secured. When more than one knife is provided, the reciprocations thereof are arranged to effect balancing. A lubricating opening 16 is closed by a screw cap 17.

420,382. Group VI. **Slicing machines.** LAMBERT, F. T., 49, Park Road, East Hill, Wandsworth, London.

In a machine for slicing pieces having a cross-section of greater breadth than thickness, which latter may be variable over the length of the piece, the table or support which normally presents the piece at right angles to the knife is so arranged that it may hold the piece at a variable inclination to the knife to cut obliquely through the thickness. The oblique cutting produces slices of greater width than would a perpendicular cutting, the wide slices being of greater value. The inclina-

FIG.1.

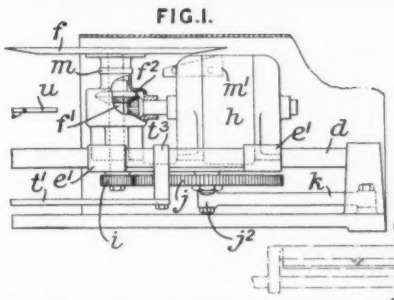
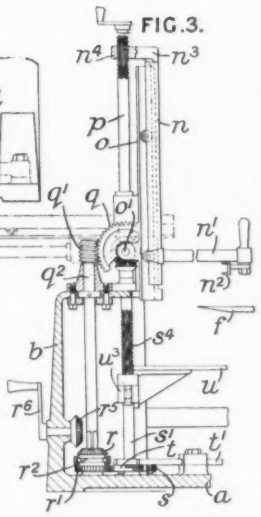


FIG.3.



tion of the table or support may be varied as the feed progresses, so that, by starting the cutting, with a relatively large obliquity, on the thin end of the piece the support is restored to perpendicularity as the cut approaches the thicker end of the piece. Slices of substantially uniform width may thus be produced. As shown, the disc knife f is journalled in a slide having lugs e^1 which embrace guide rods d. The driving motor h is carried on the slide and is geared by bevels f^2 to the knife shaft f^1, the lower end of which carries a pinion i meshing with a gear wheel j carrying a crank pin j^2. A connecting rod k is pivotally anchored to the base. The motor thus reciprocates and revolves the knife. Alternatively, the slide may be operated by a hand wheel or lever; or the knife support may be arranged to oscillate about a fixed pivot. A steel strip m acting as a scraper is raised, to contact momentarily with the bevelled side of the knife, by a cam m^1. The substance is held by a clamp bar n^2, slidable on pillars n^1, against a plate n, which is slidable on a backing table or support o, the movement of the plate n being effected by the engagement of a nut n^4, at the end of a cranked arm n^3, with the feed screw p. The table o is pivoted at o^1 to a bracket on a head b upstanding from the base a, and may occupy any angular position between the horizontal and vertical. The angular adjustment of the table o may be effected manually or automatically by the feed. A quadrant q on the back of table is engaged by a worm q^1 on a shaft q^2, at the lower end of which is slidably arranged a clutch comprising a bevel r, a spur wheel r^1, and an intermediate groove r^2 for engagement with a striking fork. The wheel r^1 is in its lowermost position, geared to a wheel s on the shaft s^1, a pawl t on a reciprocating sliding member t^1, engaging with and intermittently rotating the wheel s. The member t^1 is reciprocated by a tappet t^3 thereon, contacting, at each end of the strike of the knife slide, with a lug e^1. The shaft s^1 is connected by bevel gears to the feed screw p, and is screwed at s^4 to actuate a slice receiver u in step with the feed motion. A releasable half-nut u^3 couples the receiver to the screw. The plane of the table o and the axis of the hinge o^1 are both inclined to the direction of reciprocation of the knife, the knife thereby severing the piece at one end before the other. In operation the clutch r, r^1 is raised by the striking-fork until it meshes with the bevel r^5. By turning the handle r^6 the table o is swung to the horizontal position for clamping the meat and then to the desired initial cutting inclination. The whole piece may be sliced at a constant obliquity, or the restoration of the table o to perpendicularity may be effected manually during the slicing or, if the gears r^1, s are engaged automatically, in step with the feed. Specifications 23473/00 and 17581/03 (both in Class 28) are referred to.

420,725. GROUP VI. **Mincing machines.** SCHOLTES, J., 244, Münsterstrasse, Dusseldorf, Germany. (Assignee of Stöppel, M., 13, Kappeltor, Lippstadt, Westphalia, Germany.)

Food is minced by being passed in undulatory manner between knife edges running in the direction of advance of the material. As shown, the device used is arranged as an adjunct of a mincing machine of the kind having a forcing-screw 2 and rotary cutting-knives 11, and consists of a sleeve composed of sections 19-21 and a central cutter 7. The sections 19-21 may be formed as longitudinally split half-sections. The cutter 7 may be in sections and has knife edges 12 between ridges which, in association with guides 13, 14, constrain the food to follow the undulatory path. The general outline of the cutting surfaces is slightly conical.

FIG.1.

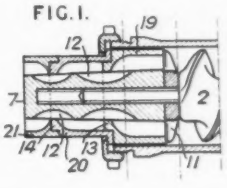


FIG.2.

The knife edges are arranged in a somewhat tangential manner on the rotary and stationary cutters and may be slightly helical. The fineness of the mincing is regulated by adding or removing sections of the cutters.

423,086. **Chocolate mass refining apparatus.** A. BECK, Langer Stieg, 1, Wernigerode in the Hartz, Germany.

The machine is designed with a view to increasing the velocity of the mass towards the end of the grinding cone which revolves in the bore of a conical casing, thus setting up an increased resistance which is reflected by partial return flow of the mass. This in turn induces a more intensive working of the mass. To take further advantage of the return flow action, a special construction causes the back-flowing mass to be squeezed into the narrow clearance between the outer circumference of the conveyor worm and its casing. Grinding action is thereby intensified, with a consequent substantial reduction in the particle size.

RECENT TRADE MARKS

(Continued from page 148)

SANTA'S PAK.—556,474. **Canned fruits.**

SCHUCKL AND CO., INC., 260, California Street, San Francisco, California, United States of America. March 13.

Registration of this trade mark shall give no right to the exclusive use of the words "Santa's Pak".

SHERBITE.—557,499. **Ice and ice-cream.**

BOURNEMOUTH ICE AND ICE-CREAM FACTORY, LTD., 57, Palmerston Road, Boscombe, Hampshire. March 13.

Registration of this trade mark shall give no right to the exclusive use of the word "Sherbite".

STELLA VERDE.—B 554,909. **Cured pilchards.**

The firm trading as PAWLYN BROS., 1, Jetty Street, Mevagissey, Cornwall. March 13.

User claimed from August, 1932.

The trade mark is limited, so far as the device is concerned, to the colour green, as shown in the representation on the form of application.

SUNRAY.—554,603. **Sild in tins for sale in the counties of Northumberland, Durham, Cumberland, Westmorland, Lancashire, and Yorkshire.**

R. S. DYSON AND CO., LTD., Colonial Buildings, Peterson Road, Wakefield, Yorkshire. February 27. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the letters "R. D. S".

User claimed from March, 1928. Section 21.

TELESTAR.—557,127. **Biscuits, wafers (for food), chocolate, and confectionery.**

NA'AMLOOZE VENNOOTSCHAP DE BEUKELAER'S FABRIEKEN BISCUITS EN CHOCOLADE, USINES DE BEUKELAER'S BISCUITS AND CHOCOLATS SOCIÉTÉ ANONYME, 127, Lange Kievitstraat, Antwerp, Belgium. March 13. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the words "De Beukelaer" and "Choco".

In use upon goods other than chocolate wafers the mark will be varied by the substitution of the name of such goods for the words "Choco Wafers".

ULTRAX.—557,236. **Tea.** THE ENGLISH AND SCOTTISH JOINT CO-OPERATIVE WHOLESALE SOCIETY, LTD., 100, Leman Street, London, E. 1. February 27.

YE OLDE GATEWAY.—555,974. **All goods in Class 42, which includes substances used as food or as ingredients in food.**

The firm trading as S. W. BUSH AND SON, West Gate, Bath, Somersetshire. February 13.

RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

554,021. **Vegetables for food.** SOCIEDAD EXPORTADORA É IMPORTADORA DE PRODUCTOS AGRICOLAS LIMITADA, Rue Aduana 3, Barcelona, Spain. February 27.

ARETHUSA.—556,470. **Tinned fish.** JOB BROTHERS, LTD., Tower Building, Water Street, Liverpool. March 13.

CAT'N FIDDLE.—555,606. **Canned fruits.** SCHUCKL AND CO., INC., 260, California Street, San Francisco, California, United States of America. March 6. (Associated.)

CHARMER. — 556,725. **Tea.** WEBER, LTD., 268, 347, and 348, Central Markets, West Smithfield, London, E.C. 1. February 20.

CHESTER CASTLE.—557,633. **Cheese, butter, and cream.** NEWHALL DAIRIES, LTD., 29 and 31, John Street, Stockport. March 13.

CLUBLAND. — B 554,761. **Marmalade.** MACONOCHIE BROTHERS, LTD., Maconochie's Wharf, West Ferry Road, Millwall, London, E. 14. March 6.

User claimed from April 10, 1927.

The applicants undertake that this mark, when registered, and the marks Nos. 32,662 (290), 474,139 (2548), 553,849 (2952), and any other marks associated therewith, shall be assigned or transmitted only as a whole and not separately.

CROMWELL. — 556,836. **All goods in Class 42, which includes substances used as food or as ingredients in food, but not including flour and not including any goods of a like kind to flour.** HUNT'S EGG AND POULTRY PACKERS, LTD., 40, Broadway, St. Ives, Huntingdonshire. February 20.

Registration of this trade mark shall give no right to the exclusive use of the word "Cromwell".

HOMESTEAD.—553,074. **Skimmed milk in tins for sale within an area having a radius of fifty miles from the Council House of Birmingham.** BROWN, HOPWOOD, AND GILBERT, LTD., St. Mary's Buildings, Lench Street, and Vesey Street, Birmingham. February 27.

User claimed from the year 1904. Section 21.

Registration of this trade mark shall give no right to the exclusive use of the devices of cows.

INDAWATI.—556,964. **Substances used as food or as ingredients in food.** PEEK BROS. AND WINCH, LTD., 20, Eastcheap, London, E.C. 3. February 20.

J. S.—B 554,607. **Grapes, lettuce, and tomatoes.** JACOBUS SCHOEMAKER, trading as Jac. Schoemaker, 323a, Haagweg, Loosduinen, Holland. February 27.

User claimed June 1, 1922.

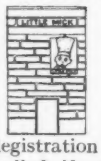
LANCE'S.—B 555,062. **Baking powder for sale in Yorkshire.** LANCE AND CO., LTD., 41, Market Place, Driffield, Yorkshire. February 27.

User claimed from January 1, 1914.

LITTLE MICK.—555,385. **Substances used as food or as ingredients in food.** THOMAS FOOD PRODUCTS, LTD., 54, New Broad Street, London, E.C. 2. February 20. (Associated.)

Registration No. 528,513 (2811) will be cancelled if and before the applicants' mark is registered.

LITTLE MICK.—555,386. **Substances used as food or as ingredients in food.** THOMAS FOOD PRODUCTS, LTD., 54, New Broad Street, London, E.C. 2. February 20. (Associated.)



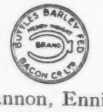
Registration No. 528,513 (2811) will be cancelled if and before the applicants' mark is registered.

MEADOW-SWEET. — 555,693. **Biscuits.** PEEK, FREAN AND CO., LTD., 158, Drummond Road, London, S.E. 16. February 27. (Associated.) (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the device of biscuits.

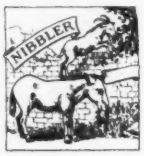
The above-mentioned goods will be struck out from the goods of Registration No. 403,539 (2215) if and before the applicants' mark is registered.

MERRY-THOUGHT. — 554,277. **Bacon, hams, lard for use as food, and butter.** BUTTLES BARLEY FED BACON CO., LTD., Slaney View Bacon Factory, Templeshannon, Enniscorthy, Co. Wexford, Irish Free State. February 27. (Associated.)



NESTONIA.—555,250. **Eggs, bacon, ham, tongue, and pressed beef.** GEORGE KING AND SONS (NOTTINGHAM), LTD., 29, Castle Gate, Nottingham. March 13. (By Consent.)

NIBBLER.—554,384. **Fish, fruit, meats, vegetables (for food), jams, marmalade, mincemeat, butter, margarine, cheese, and condensed milk.** HOME INDUSTRIES, LTD., 76, Station Road, Worthing. March 13.



Registration of this trade mark shall give no right to the exclusive use of the word "Nibbler".

NUDARL.—556,980. **Margarine and compounds consisting of mixtures of oils and fats for use as substitutes for lard.** WESTERN MARGARINE, LTD., Alliance Factory, Western Avenue, Acton, London, W. 3. February 27.

P. & T.—548,132. **Substances used as food or as ingredients in food, but not including mixtures for making cakes, condensed milk, yeast, salt, gravy salt, or gravy browning, and not including any goods of a like kind to any of these excluded goods.** P. AND T., LTD., 12 and 13, Embankment Place, London, W.C. 2. February 20.

Registration of this trade mark shall give no right to the exclusive use of the letters and abbreviation "P. & T".

PINEVITA.—557,677. **Canned pineapples.** UNITED BALTIC CORPORATION, LTD., 158, Fenchurch Street, London, E.C. 3. March 13.

PURE CREAM.—554,854. **Cream.** DEVON AND DORSET DAIRIES, LTD., 37 and 38, Fenchurch Street, London, E.C. 3. February 27. (Associated.)

READY PREPARED.—554,145. **Prepared coffee in liquid form.** WILLIAM WINSHIP AND CO., LTD., 82, Warrington Road, Newcastle-upon-Tyne. March 6.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the words "Winships" and "Ready".

RED, WHITE, AND BLUE.—B 555,663. **Coffee and chicory mixture.** SAML. HANSON AND SON, LTD., 14, Eastcheap, London, E.C. 3. February 27.

User claimed from December 22, 1931.

The trade mark is limited to the colours red, white, and blue, as shown on the form of application.

The applicants undertake that this mark, when registered, and the marks Nos. 20,687 (250), 27,009 (250), and 27,011 (250), shall be assigned or transmitted only as a whole and not separately.

RIDGWAYS.—557,209. **Tea.** RIDGWAYS, LTD., 290 to 314, Old Street, London, E.C. 1. February 27. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the word "Digestive" and the device of a tea plant.

(Continued on page 147.)